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ABSTRACT

This document consists of the materials presented at a one-day workshop dealing with a new concept in articulation between secondary and postsecondary institutions that involves two years of pretechnology education at the secondary level and two years of training in any one of a number of technical and high-technology fields at the postsecondary level. Included in the volume are the following presentations and other materials: "2 + 2 Tech Prep/Associate Degree Program; A Working Degree for America" by Dale Parnell; "What High Schools and Postsecondary Schools Are Finding about Training Technicians" by Daniel M. Hull; a section called "What Are the Issues?" containing materials for use in small group discussions; "Establishing an Articulation Process" by W. Alan Sosbe; a section on "Building an Articulation Plan for Your State or District" containing materials for use in small group planning; and "A National project Leading to 2 + 2 Programs Principles of Technology" by Daniel M. Hull and Bennie F. Lucroy. The texts of presentations describing examples of various 2 + 2 programs by the following individuals are also provided: Jack Isch, representing Oklamoha City, Oklahoma; John Washburn, representing the Illinois Board of Education; LeAnna Skogen, representing Aurora, Colorado; and Paul L. Cummings, representing Newport News, Virginia. (MN)

SECONDARY/POSTSECONDARY COOPERATION

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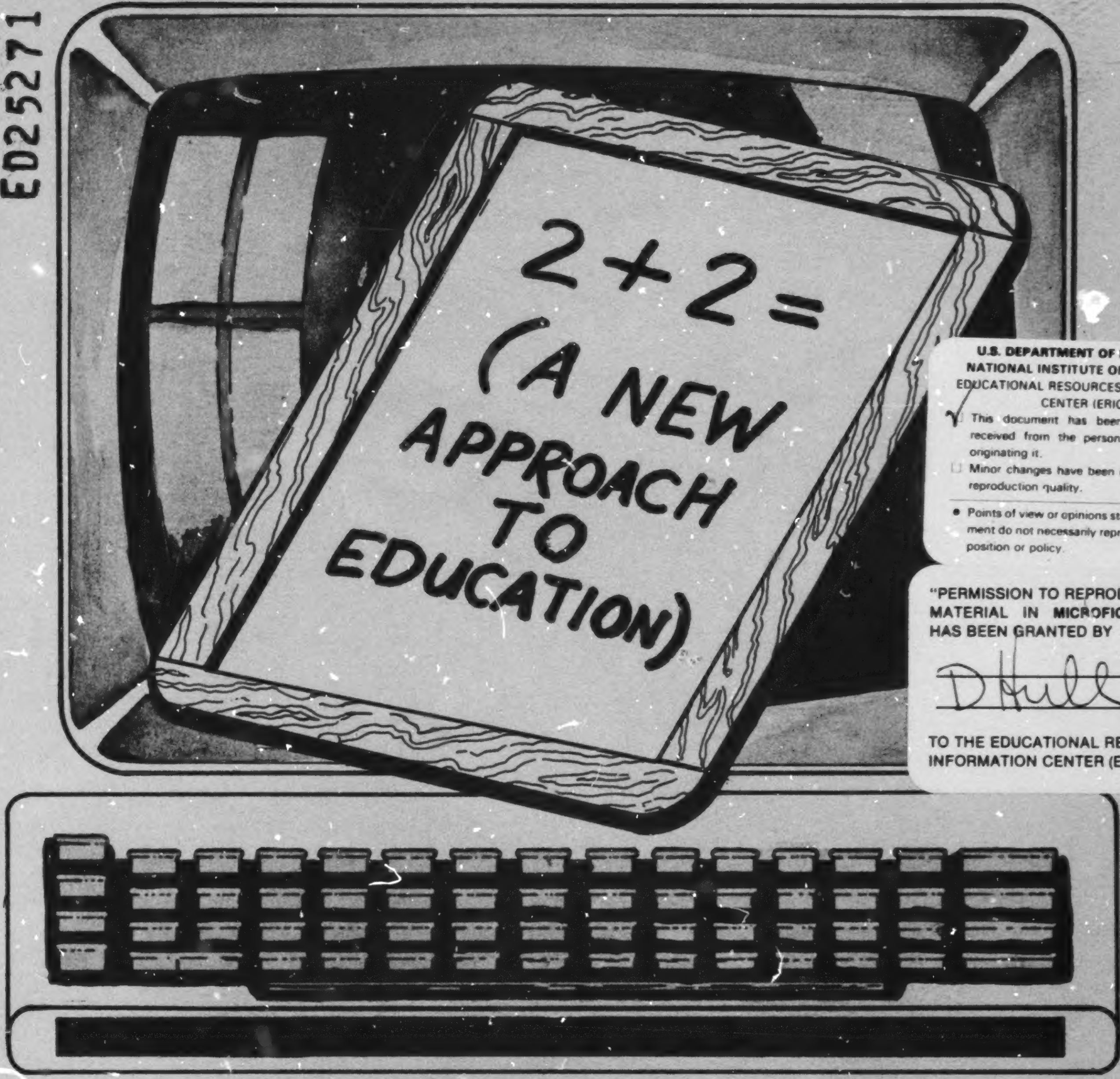

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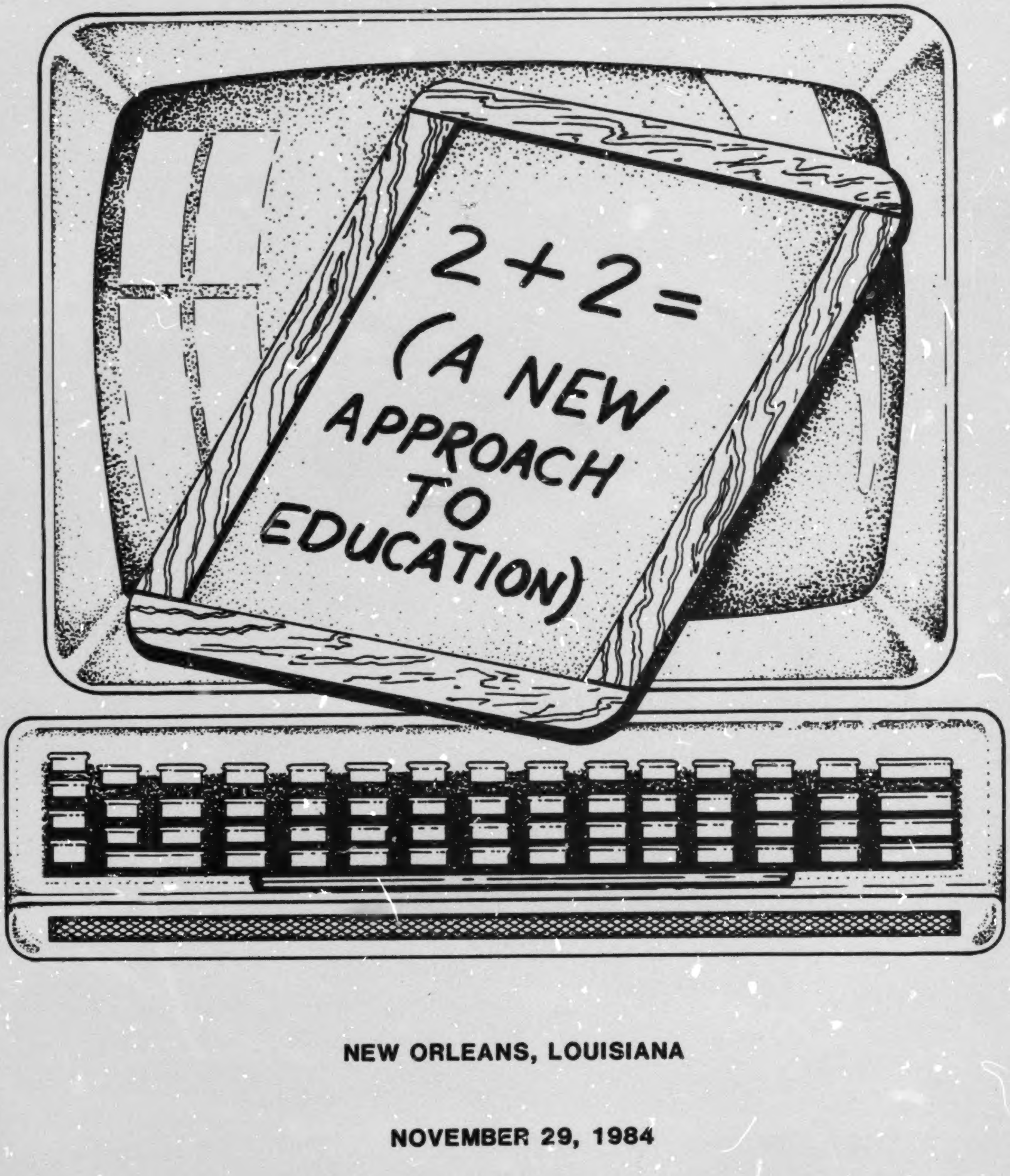
2+2=
(A NEW
APPROACH
TO
EDUCATION)

NEW ORLEANS, LOUISIANA

NOVEMBER 29, 1984

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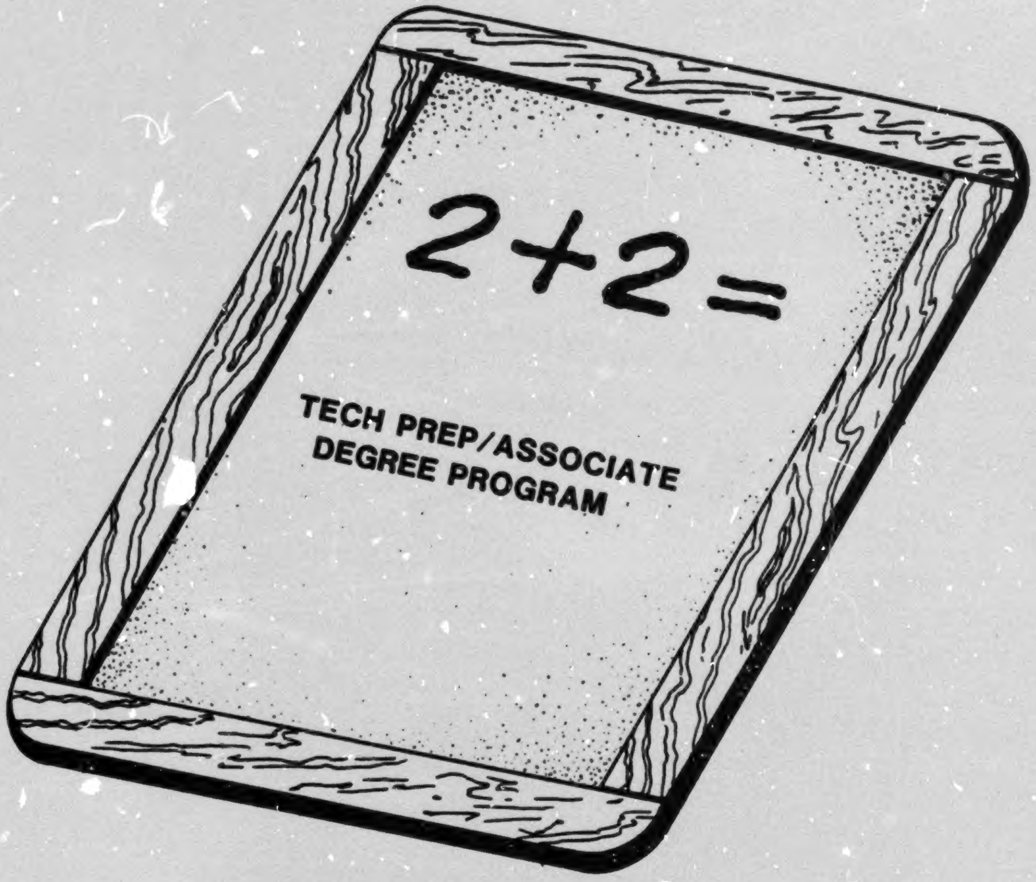
2 + 2 SECONDARY/POSTSECONDARY PROGRAMS:
A NEW APPROACH TO ARTICULATION

November 29, 1984

Rivergate Convention Center
New Orleans, Louisiana

AGENDA

7:30 AM- 8:30	Registration	
8:45	Welcome, Purpose of Workshop	
9:00	2 + 2 Tech Prep/Associate Degree Program A Working Degree for America	Dr. Dale Parnell
9:30	What High Schools and Postsecondary Schools Are Finding About Training Technicians	Mr. Daniel M. Hull
9:50	Who Is Doing It? Examples of 2 + 2 Programs Dr. Jack Isch, Oklahoma City, Oklahoma Dr. John Washburn, Illinois Board of Education Mrs. LeAnna Skogen, Aurora, Colorado Mr. Paul Cummings, Newport News, Virginia	
11:30	What Are the Issues? Discussion of Issues in Small Groups • Trade • Health • Technical • Office	
12:30PM	Lunch	
1:30	Establishing a 2 + 2 Process	Mr. W. Alan Sosbe
2:00	Building an Articulation Plan for Your State or District Small Group Planning • Trade • Health • Technical • Office	
3:15	Group Reports and Discussion	Dr. Gene Bottoms
4:00	A National Project Leading to 2 + 2 Programs Principles of Technology	Mr. Daniel M. Hull and Mr. Bennie F. Lucroy
4:45	Benefits--Commitments--Future Plans	
5:15	Adjourn	


2+2=
TECH PREP/ASSOCIATE
DEGREE PROGRAM

A WORKING DEGREE FOR AMERICA

2 + 2 TECH PREP/ASSOCIATE DEGREE PROGRAM
A WORKING DEGREE FOR AMERICA

A CONCEPT PAPER
BY

DALE PARNELL
PRESIDENT
AMERICAN ASSOCIATION OF COMMUNITY AND JUNIOR COLLEGES

OCTOBER 1984

Dale Parnell is President of the American Association of Community and Junior Colleges, which represents a field of 1219 institutions enrolling 11.4 million persons in credit and noncredit programs. Prior to assuming the presidency of the Association in 1981, Dr. Parnell was President of San Joaquin Delta Community College in California. Previously, he was the first Chancellor of the San Diego Community College System. He served earlier as Oregon's Superintendent of Public Instruction and as the founding President of Lane Community College in Oregon. He is an advocate for community, technical and junior colleges with a strong personal and professional interest in technical education. He is a spokesman for community colleges and to community colleges on the need for strong partnerships with business, industry, and labor.

This statement was developed with the assistance of Nancy Armes, Administrative Assistant to the Chancellor of the Dallas County Community Colleges.

DRAFT

2+2 TECH PREP/ASSOCIATE DEGREE PROGRAM
A WORKING DEGREE FOR AMERICA

"We are living in the time of the parenthesis, the time between eras," John Naisbitt tells us. It is a time of ambiguity, of change, and questioning, a time electric with possibilities when a single model for achievement will always be limiting, a time when, Naisbitt suggests, "those able to anticipate the new era will be a quantum leap ahead of those who hold on to the past."

For community college educators, it is a time when the variety of excellence we aspire to represent in higher education must match, in sufficient portions, the variety of challenges presented to us. Trend analysts, forecasters, policy-makers, strategic planners--all find dramatic ways to underscore what we have already begun to understand in a visceral way. The information age, sped by technological advance, presents a richer, more complex reality in which human beings seem to want more of life and work.

They want the range of choice extended, so that their lives and work are not unnecessarily degrading or boring or limiting.

They want to participate more, with collaborations, teams, and networks becoming more descriptive of institutional life and organizational processes.

They want connectedness, the ability to see relationship between what they do and the larger whole, between themselves and their associates.

They want to continue to learn through a career, to avoid obsolescence and to restore personal energy.

They want greater control over the variables that make up their work lives, as a kind of fail-safe device against the level of complexity with which they must deal.

They want coherence and have less patience with wasted effort.

They want greater structure and substance in their educational programs.

If these needs and expectations are used as signposts to help us formulate a more accurate profile of America's future work force, a slightly out-of-focus picture begins to gain clarity. If a higher quality of work life is to become a reality for millions of Americans, perhaps the most fundamental emerging truth is that higher and more comprehensive skills must be developed, particularly by the middle two quartiles of the work force. More sophisticated manual as well as conceptual skills will be in demand, and this worker cohort will be consistently pushed to handle a broader range of job requirements. Because of increased demand, more tasks once reserved for baccaluareate degree or advanced degree performers must be assumed by those with fewer years of education and training, and all workers will need to learn throughout a career to remain useful.

Not only do we anticipate that these demands will surface in the future, but we know what human resources will be available to meet these demands: All who will be part of the work force in the year 2000 are alive today. Thus we can extrapolate much from the age, sex, ethnic, and regional mixes with which we will be working. Our experience level alone suggests that it will be easier to create an information age work force than to maintain one. Since we know less about job replacement than job placement, more about training than retraining, we must learn quickly the lessons of program articulation and continuity in the learning process.

We have been told that more people in our society will be working at low skill jobs--i.e., clerks, custodians, waiters. But sheer volume of numbers does not give an accurate picture of future employment skill needs, especially for educators trying to meet new competency requirements created by an information society. Occupational Employment Projections list the 20 fastest growing occupations from 1988 through 1995. None can be classified as low skill--needing only a high school degree, only two obviously require a bachelor's degree. The remaining eighteen are occupations for which community, technical, and junior colleges provide training.

We will need custodians and waiters, but it is more myth than reality that technology will diminish the need for workers professing a middle range of skills. That need will grow--dramatically! During the last decade, we have been in the beginning of a "product life-cycle," as we first embraced the information age. This initial phase has been pushed along by the more advanced skills of scientists, engineers, and top level management. However, with growth and maturity, with what Bobby Inman describes as the "commercialization of technology," the volume of need for a mid-range of workers (which this report designates technicians) will grow. These workers will help us maintain and adapt existing information age systems.

Table 1
1983 and 1984 Comparisons
Occupational Status of the Employed

Occupation	Civilian employed	
	Aug. 1983	Aug. 1984
Total, 16 years and over	103,167	106,694
Managerial and professional speciality	20,044	24,460
Executive, administrative and managerial	10,814	11,789
Professional specialty	12,230	12,671
Technical, sales and administrative support	31,840	32,924
Technicians and related support	3,091	3,175
Sales occupations	12,140	12,891
Administrative support, including clerical	16,608	16,858
Precision production, craft and repair	12,794	13,641
Mechanics and repairers	4,230	4,477
Construction trades	4,602	5,023
Other precision production, craft and repair	3,963	4,141
Operators, fabricators and laborers	16,498	17,193
Machine operators, assemblers and inspectors	7,905	8,105
Transportation and material moving occupations	4,198	4,480
Handlers, equipment cleaners, helpers and laborers	4,396	4,608
Construction laborers	674	732
Other handlers, equipment cleaners, helpers and laborers	3,721	3,875
Service occupations	14,510	14,291
Private household	1,015	1,000
Protective service	1,827	1,757
Service, except private household and protective	11,667	11,535
Farming, forestry and fishing	4,481	4,185

A SCENARIO FOR THE FUTURE OF WORK

> "The main implication for education of the saturation of society with technology is that understanding technology becomes a primary concern....It is not true that understanding science and mathematics conveys an equal understanding of technology."
>
> --*Educating Americans for the 21st Century*
> National Science Foundation

Naisbitt traces the occupational history of the United States from farmer to laborer, to clerk, from rural to blue collar to white collar America. He invites us to speculate about the new worker that will characterize our society as we move past the parenthesis, into a new era.

Obviously what is needed as a new standard bearer is a worker who has developed a cluster of skills that reflects many of the critical trends encapsulated above, a worker who is less narrowly focused and whose responsibilities span several work areas. What is needed is a *technician*, if by that term we are describing an employee who:

* understands the basic principles of technology in an information age saturated with the use of technology.
* connects practice and theory in the work world.
* identifies problems and then analyzes, tests, and troubleshoots to find solutions.
* integrates the interests of complementary work areas.
* works independently much of the time, under the general supervision of a highly skilled, frequently more narrowly specialized professional.
* works willingly and well with his/her hands as well as with the brain.
* has mastered a basic skills package that includes a core of competence in math, science, computer science, and communications.

In its recent report, looking at the quality of learning under its purview, the National Science Foundation warned that technology must be considered a new entity by educators, not an extension of science and mathematics. Foundation analysts further warned that if technology becomes an isolated content domain, our society will create more problems than it will solve. Their conclusions about the effect of technology on science and math apply to the broad spectrum of career interests in this nation. Technology can compartmentalize us more or make us more responsive. It can create greater understanding and involvement within the work force or it can isolate us, one from the other.

This concept paper proposes that, as defined here, the technicial will characterize the mainstream development of our nation's work force in the future. The occupational history of this country will chronicle from farmer to laborer to clerk to technician. Technicians will become the glue that holds together the thousands of potentially isolated elements in our work world. They will be the professionals who understand and can apply underlying principles, who have enough knowledge and judgement to break down arbitrary barriers, who are generalists enough to spot waste and duplication in the organization, who have practical skills to address typical problems that arise.

THE PRESS OF PRESENT CIRCUMSTANCE

As educators, in a score of national reports, we have been told we must respond. We have heard a call for change and reform at all levels. The information revolution, it seems, has made the weaknesses in our educational programs more visible. The heart of the message we have heard from politicians and parents and policy-makers: Give us more structure. Give us more substance. Make us more certain that the materials and scaffolding of our educational structures match our sense of what an excellent education is about.

In the process, indirectly, these analysts have asked community, technical, and junior colleges to grapple with a host of perplexing patterns and problems. These colleges obviusly must build on secondary school preparation. Again and again as the first wave of reports concentrated on K-12, nagging problems at the seondary school level focused immediate concerns for community colleges, and indeed, tended to call attention to articulation weaknesses or omissions. Briefly here are issues that have emerged.

Slippage

> "I would put the subject of school dropouts first. It is absolutely astounding to me that so many intelligent people could look for so long at American schools and say so little about this problem."
>
> --Harold Howe
> Harvard University School of Education

Secondary schools should prepare students for the next step, whatever that step may be. But the numbers would tell us that they do not prepare all. According to the 1980 Census, just over 30 pecent of high school students drop out, and there has been a 5 1/2 percent increase in that percentage from 1972 to 1982. Of the pool that does graduate, about a third move into postsecondary education, but only 17 percent of that group complete a baccalaureate degree by age 25. Within the articulation patterns of these students, there are worrisome indicators of slippage:

> About a third of high school graduates complete a "general" curriculum as opposed to college preparatory or vocational programs. Generally speaking, these graduates receive less career counseling, have fewer marketable skills, and are unlikely to find the kinds of work that can be seen as an initial step in a career ladder, at least for several years. Their expectations are fuzzy and unrealistic.
>
> Almost another third of high school graduates finish vocational programs. But the percent trained as technicians is very low (1%). Almost 50 percent of high school vocational training is in agriculture, home economics, and industrial arts, areas that do not reflect the most pressing needs of the marketplace.
>
> Nor do high schools have the resources to mount technical education programs that more nearly reflect the needs of the marketplace. As community colleges well know, such training programs are expensive and constantly in need of update. In addition, students pursuing vocational specialization at the high school level do not generally receive stringent basic skills training. If they do not find work related to their training, they are likely unemployment candidates.

14

If projections hold, between now and 1990, the number of students that finish baccalaureate degrees will remain relatively stable, but the number seeking further training beyond high school will continue to increase by 10 percent. Generally speaking, those high school students coming to community colleges for further training will already be hampered by poor decisions.

Nationally, community college retention figures hover at 50 percent. From semester to semester, we hold only about half the students who come to us. The reasons are numerous and complex, but the effect of this slippage is significant.

We must provide more models designed to slow the slippage to bring more structure and substance to the curricular program, to make program and degree completion more likely. This concept proposes one such model.

Continuity

> "Vocational/technical training has been community colleges' outstanding success, but you have not thought out your linkage with high schools."
>
> —Governor Bruce Babbitt
> State of Arizona

Research and experience tell us that students work better with goals, indeed so do we all. Yet there is a lack of clarity in what high schools and postsecondary institutions expect of their students. There is poor program articulation between these two educational entities; and even more serious, there is a subtle but stubborn provincialism that suggests that articulation--the careful building of bridges between high schools and colleges, or evaluation--the careful measure of success or failure, are extraneous to the primary mission of either group. A recent survey of community colleges reveals that 75 percent of the colleges report little or no program coordination with feeder high schools.

The national reports have given only cursory attention to the need for continuity in learning, forgetting all the dangerous lessons that the business world has learned of late--when the left hand does not really understand what the right is about. Again, the indicators are not difficult to find.

> The concern that high school students are still not concentrating on developing the "new basics" has been confirmed in a study by the National Center for Educational Statistics. The study found that students are not taking recommended loads in such "new basic" subjects are mathematics, science, and computer science. Interestingly, in the twelfth grade, the senior year, fewer courses

were completed in these new targeted areas than in any other high school year, even though these seniors were below recommended guidelines.

High schools do not have a good sense of how their students perform once at college or in the work world. While we have no clear evaluative data about these transitions, community colleges must deal with students who have failed to reach their own or others expectations upon high school graduation.

General speaking, the courses a student takes are not important in getting into college, although they may be critical to success once a student is there. In about half of the nation's colleges, there are no specific course requirements for admission.

Students do not have realistic expectations about what constitutes college level work or how a particular career choice dictates a pattern of study. A recent Penn State University study of freshmen found that 90 percent expected to have a "B" grade point average. Sixty percent of the survey group estimated they would study fewer than 20 hours a week. Eighty percent knew little about their major.

We must build more substantive partnerships with high schools. We must share information and expectations with each other and our students. This concept paper proposes one such partnership.

Structure and Substance

"During what now seems like a golden age of American education, there were two clear, specialized tracks. There was a good academic track for the university-bound students and a good vocational track for work-bound students. The "general" track--which led to limbo--was small. But the Excellence Commission notes that the number of students on this general track, this track leading nowhere, has increased from one in eight to nearly one in two. And that, more than anything, is the center of the problem."

--Marvin Feldman
President
New York Fashion Institute of Technology

While the national reports acknowledge the need for substance and structure, they also explicitly and implicitly acknowledge the primary reason that issues of quality have been raised: education at all levels has not kept pace. A general education track provides little structure, and insufficient substance or motivation for most ordinary students. The body of knowledge is reconfiguring around us and we have discoverd that many students are ill-equipped to deal with the changes. Both high schools and colleges must meet this challenge. They must set aside the safety and security of familiar patterns when necessary.

Certainly such change is not easy. Too often our caution and reluctance to let go of the familiar bog us down, as indicators again highlight.

> Employers designate the ability to learn as the essential hallmark of the successful employee. Yet, in all educational arenas we still spend little time on process skills--problem-solving, synthesis, analysis, critical thinking, etc. Upper level high school science and math continues to be too abstract and theoretical for perhaps two-thirds of the student body who desperately need more practical skills development in math and science.
>
> A dusty debate continues. The Morrill Act of 1862 was to promote practical and liberal education for an agrarian society. Yet land grant colleges and the rest of postsecondary education have still not resolved what practical means, nor have they managed a happy marriage of the two.
>
> The definitions and use of tools are pointedly absent from the education of young people. Yet the practical expressions such tools represent are essential to the quality of work we produce in a technological world.
>
> The urgent request that basic skill development must be a part of vocational programs is now familiar; yet, generally speaking, neither high schools nor community colleges have built interdisciplinary configuarations necessary to bring this about.
>
> A broad-based systems approach to technicial training will discourage career obsolesence, we are told. But in practice, the new courses most often added to degree plans reflect an increasing specificity of emphasis.

> And perhaps the key struggle for community colleges is that as open-door colleges, they have side-stepped the need to clearly state their own preparation expectations for incoming students. If they are to have the best chance for success in our colleges, high school students must have a clear sense of what it will take to succeed. Young people hold only vague notions of what adequate preparation for a community college experience means.

The challenge of the open door is to find ways to increase healthy risk to bring change. New models, new reconfigurations will occur only when the needs of students are placed above special interest claims. This concept paper proposes one such model.

2 + 2 TECH PREP/ASSOCIATE DEGREE PROGRAM

A PARTNERSHIP AMERICA NEEDS

> "...there is surprisingly little attention given to 'ordinary people' in the school reform reports. There is the clear implication that the rising tide of mediocrity is made up of embarrassing numbers of ordinary people, and if we want to return excellence to education, we better go out and find more excellent people."
>
> —Pat Cross
> Harvard University School of Education

This concept paper advocates taking a step beyond current high school/college partnership agreements. Furthermore, it is targeting ordinary students...the high school student not part of the college prep track. It is offering that large group (almost two thirds of high school graduates) a quality program that will provide access to a mid-level range of career choices.

A History on Which to Build

Many postsecondary institutions have initiated high school/college partnerships and program articulation programs. The programs seem to fall into four major categories:

1. Joint enrollment is the most common cooperative program. The primary purpose of joint enrollment is to provide a stimulating challenge for students who need more than the standard high school and/or college credits. Some state level funding formulas reward both schools and colleges for joint enrollment participation. It is estimated that 28,000 high school students are involved in such programs.
2. Sharing of faculty and/or facilities is another form of cooperation. High school students often will take classes in a nearby community college facility. Such classes often will be led by a community college faculty member.

Although not as common, at other times, college faculty go to the high school to teach a class.

3. Advance Placement is a program aimed at motivating academically talented students to earn college credit while still in high school. Even though placement is primarily determined by tests, an increasing number of colleges are offering advance placement credit via the joint enrollment process.

4. Program articulation efforts, though few and far between, are increasing. High school and college faculty and administration are developing written program articulation agreements. These agreements are most often found in vocational/technical courses and programs.

Tech-Prep/Associate Degree Assumptions

> "Like it or not, our educational institutions have little choice but to change with the times. Either that or be left in the wake of untold technological breakthrough."
>
> --*Jobs for the 21st Century*

Taking into account the trends and patterns described in the first half of this paper, a second more focused set of assumptions with specific implications for the creation of a tech-prep program must be recognized.

1. Community, technical, and junior colleges have a special responsibility to give clear signals to high school students about preparatory requirements.
2. Similarly students need more descriptive programs that help them plan for future employment. It is clear that many students need a clearer focus for their efforts. Aimlessness is one of the plaques of both secondary and college students.
3. Much greater emphasis must be given to helping students who are not in college prep coursework understand basic principles that undergird their lives and work.
4. The Associate Degree can logically become the preferred degree for most mid-level occupations. That pattern of acceptance has begun and must be encouraged.
5. Many emerging technical/occupational training programs cannot be completed in two years, particularly if the student is given strong basic skills preparation. More time is required.
6. A "job cluster" program can tie curriculum to the goals of students in such a way that they are motivated while in school, and also better equipped to take that next step. A tech-prep program accomplishes this clustering.

7. A closely articulated four-year technical education program will provide more adequate room for electives than the current two-year college program. This will increase the likelihood of a quality general education experience for students not pursuing a baccalaureate degree.
8. Tech prep is one way to apply the tests of rigor and excellence so often associated with college prep programs, but to the experiences of high school students who are part of a general program (39%) or part of a high school vocational program (27%).
9. This program's audience is much broader than the needs of the "high technology" marketplace. The 2-2 technician will be suited for a wide array of mid-level occupations.

The 2 + 2 Tech Prep Associate Degree Program

> "A broad-based systems approach to technician training will prevent obsolescence and permit the techinician to be adaptable to contiuning change.
>
> --Robert Steely
> Kellogg Community College

The 2 + 2 Tech Prep/Associate Degree program is a four-year program intended to parallel the current college prep/baccalaureate degree programs. It calls for a blending of general education and vocational education. Its foundation is basic skill development in math, science, communications, and technology--all in an applied setting.

Beginning with the junior year in high school, students will select the tech-prep program (even as they now select the college-prep program) and continue for four years in a structured and closely articulated curriculum. They will be taught by high school teachers in the first two years and will have access to college personnel and facilities when appropriate. Starting with a solid base of applied science, applied math, literacy courses, and technical programs, the high school portion of the career program will be intentionally preparatory in nature. Built around career clusters and technical systems study, such a tech prep approach will help students develop broad-based competence in a career field and avoid the pitfalls of more short term and narrowly delineated job training.

This high school tech-prep program will then dovetail with specific technical education programs in community, technical, and junior colleges. At the college level, more intense technical specializations will be developed, always in tandem with broad technical competence and board education competence.

It is anticipated that one end result of this program will be the enhancement of the associate degree to the point that it will become the preferred degree for employers seeking to fill a broad range of mid-level occupations. As a result of employer demand, students will seek the degree and view the degree as a preferred career development goal.

Making the Partnership Work

All of this will require close curriculum articulation...and most importantly will require high school leaders and community college leaders to talk regularly with one another, and with employers.

If it succeeds, the tech prep/associate degree concept will provide a dramatic model for educators wishing to avoid slippage, loss of contiunity in learning, and bring more program structure and substance as they serve the needs of all students. Specifically,

- Students will develop sound general skills and knowledge.
- Students will obtain first-rate technical preparation.
- High schools will motivate more students and perhaps lose fewer between grades 10 and 11.
- Community colleges will gain better prepared high school graduates.
- For all, a 2 + 2 tech-prep/associate degree program will encourage more high school students to continue their education in meaningful ways.
- Employers will gain better prepared employees.

TECH-PREP FACT SHEET

- 55 percent of entering freshmen in all higher education begin their college career in a community, technical, or junior college.

- 83 percent of the adult population does not hold a bachelor's degree.

- 25 percent, or 1 out of 4, students do not complete high school.

- The high school drop-out rate increased 5 1/2% between 1972 and 1982.

- The 20 fastest growing occupations in 1982-1995 all prefer postsecondary education and training, e.g., computer science technician, office machine service technician, engineering technician, banking and insurance personnel. Only 2 of the 20 require a baccalaureate degree.

- As reported by high school graduates in the National Longitudinal Study of the Class of 1980, programs of study completed were:

  Academic (College prep) -- 34%
  Vocational -- 27%
  General -- 39%

- The Southern Regional Education Board reports that less than 1 percent of the high school students in vocational programs that train for specific occupations are in technical education programs.

- The American Electronic Association report entitled, "Technical Employment Projections, 1983-87," indicates that the electronics industry will need 60 percent more technicians by 1987 than were employed in 1983. That means 115,000 new electronic technician jobs will be needed by 1987, in addition to other worker replacements.

- Private sector employment growth in the future will be in companies with 50 or fewer emloyees.

- The Associate Degree is becoming the preferred degree for entry in many technician occupations.

- American private sector business and industry spends an estimated $30 billion a year on the education and training of 11 million employees.

- All who will be in the work force by the year 2000 are alive today.

- A recent Penn State University study indicates that 98 percent of entering college students in 1982 and 1983 expect a "B" grade point average in college. Sixty-one percent estimated they would study fewer than 20 hours per week.

- The same Penn State study found that 80 percent of entering college students said they knew little or nothing about their choice of major.

HELP WANTED ADS OF THE FUTURE

These seven ads typify the shifts that are coming in the nation's job market, changes that are bound to impact the education and training of the work force of the future.

GERIATRIC SOCIAL WORKER: Inner-city private nursing home, immediate opening for capable, reliable person. Must be L.P.N. or have equivalent education. Salary $16,000 thru $22,000 depending on experience. References required. Equal Opportunity Employer. Associate Degree Preferred with Broad Education Background.

LASER PROCESS TECHNICIAN: High-technology firm needs dependable, experienced laser technician. Should have two years related laser cutting machine experience or will train. Flex time and day care available. Job sharing and shared dividends. Salary $16,000 to $25,000 negotiable. E.O.E. Associate Degree Preferred with solid math and science background.

GENETIC ENGINEERING TECHNICIAN: Positions available for both process technicians and engineering technicians. Relocation. Must have two years technical education and training. Additional education paid by company. Moving expenses paid by firm. Company will buy your present home. $20,000 to $30,000. E.O.E. Associate Degree Preferred with Broad Science Background.

BATTERY TECHNICIAN: Large oil firm needs five technicians with previous experience in fuel cells or high-energy batteries. Shift work, O.T. available, dressing rooms and private locker, discount on all corporate products. Education and managerial training available. $15,000 to $20,000. E.O.E. Associate Degree Preferred.

ELECTRONIC TECHNICIAN: Small electronics company needs dependable and broadly educated technician. Must be knowledgeable of fluid power systems, mechanical systems, as well as electrical systems. Flex-time available.

Company stock plan available. Salary $18,000 to $28,000 negotiable. E.O.E. Associate Degree Preferred.

STAFF ASSISTANT: County Tax Assessor needs dependable executive secretary skilled in use of word processor and microcomputer. Must have good interpersonal skills with ability to remain calm in conflict situations. Salary range: $16,000 to $24,000. E.O.E. Associate Degree Preferred with Broad Educational Background.

POLICE OFFICER: City of Serenity needs police officer who has completed an associate degree law enforcement training program or graduate of a police academy. Excellent communication skills required. Preference in the point system will be given to those candidates able to communicate easily in Spanish. Salary $20,000 to $30,000 with excellent fringe package. E.O.E. Associate Degree Preferred with Broad Educational Background.

KERN HIGH SCHOOL DISTRICT AND BAKERSFIELD COLLEGE
AGRICULTURE BUSINESS

GRADE 11 FALL

COURSES	SITE
American History	HS
English	HS
Mathematics	HS
Physical Science or Chemistry	HS
Typing/Computer Intro.	ROP
Ag. Bus. 1—Intro. to Cal. Ag. (3)	BC/C

GRADE 12 FALL

COURSES	SITE
American Government	HS
English	HS
Conversational Spanish	HS
P.E. or Elective	HS
Technical Math (3)	C
Ag. Bus. 3—Ag. Mkt. & Econ. (3)	BC/C

GRADE 13 FALL

COURSES	SITE
English-Composition (3)	BC
Humanities (3)	BC
Ag. Bus. 5—Ag. Computers (3)	BC/C
Acctg. 53A Intro. to Accounting (3)	BC
Elective (3)	BC/C

GRADE 14 FALL

COURSES	SITE
*English-Technical Writing (3)	BC
Behavioral Science (3)	BC
Physical Fitness	BC
Ag. Bus. 7—Calif. Agriculture Law	BC
Elective (3)	BC/C

GRADE 11 SPRING

COURSES	SITE
American History	HS
English	HS
Mathematics	HS
Physical Science or Chemistry	HS
Typing/Computer	ROP
Ag. Bus. 2—Ag. Bus. Management (3)	BC/C

GRADE 12 SPRING

COURSES	SITE
American Government	HS
English	HS
Conversational Spanish	HS
P.E. or Elective	HS
Technical Math (3)	C
Ag. Bus. 4—Ag. Acctg. & Farm Mngt. (3)	BC/C

GRADE 13 SPRING

COURSES	SITE
English-Speech (3)	BC
Ag. Bus. 6—Ag. Labor Relations (3)	BC
Physical Fitness (1)	BC
Acctg. 53B (3) to Accounting	BC
Elective (3)	BC/C

GRADE 14 SPRING

COURSES	SITE
Humanities (3)	BC
Fine Arts (3)	BC
Mgmt. 59 Personnel Management (3)	BC
Elective (3)	BC
Elective (3)	BC

CERTIFICATE OF COMPETENCY IN TYPING	HIGH SCHOOL DIPLOMA AND/OR CERTIFICATE OF COMPETENCY IN AGRICULTURE	CERTIFICATE OF COMPETENCY IN THE USE OF COMPUTERS IN AGRICULTURE	ASSOCIATE OF SCIENCE DEGREE IN AGRICULTURE BUSINESS

DIPLOMA/CERTIFICATE/DEGREE

WHERE COURSES WILL BE TAUGHT (SITE):

AGRICULTURE CENTER -- C
BAKERSFIELD COLLEGE -- BC
HIGH SCHOOL CAMPUS -- HS
REGIONAL OCCUPATIONAL PROGRAM — ROP

NO. OF COLLEGE UNITS INDICATED IN:

( )

SUGGESTED ELECTIVES

AN. S. 1 -- INTRO. TO ANIMAL HUSBANDRY
AN. S. 2 -- BEEF PRODUCTION
AN. S. 3 -- SHEEP PRODUCTION
CRP.S.1 -- PRINCIPLES CROP PRODUCTION
CRP.S. 2 -- ALFALFA & FOR. CROPS
CRP.S. 3 -- TREES & VINES
CRP.S. 4 — ADVANCED TREES & VINES
MECH. AG. 1 — INTRO. AGRIC. MECH.
MECH. AG. 2 - AG. EQUIPMENT SER. & OPER.
ORNMENTAL HORTICULTURE 2 — NURSERY MNGNT.
ORNMENTAL HORTICULTURE 3 — PLANT I. D.
ORN. HORT. 4 - PLANT IDENTIFICATION
BUS. A. 1A -- PRINCIPLES OF ACCOUNTING (3)
BUS. A. 1B — PRINCIPLES OF ACCOUNTING (3)
ACCTG. 54 — PAYROLL ACCOUNTING (3)
ACCTG. 3 — TAX ACCOUNTING
BUS. A. 18A -- BUSINESS LAW (3)
INSUR. 21 — PRINCIPLES OF INSURANCE (3)

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* Courses to be designed

KERN HIGH SCHOOL DISTRICT AND BAKERSFIELD COLLEGE
CROP SCIENCE

GRADE 11 FALL

COURSES	SITE
American History	HS
English	HS
Mathematics	HS
Physical Science or Chemistry	HS
Typing/Computer Intro.	ROP
Ag. Bus. 1—Intro. to Cal. Ag. (3)	C

GRADE 12 FALL

COURSES	SITE
American Government	HS
English	HS
Conversational Spanish	HS
P.E. or Elective	HS
Technical Math (3)	C
Crop.S. 1--Prin. of Crop Production (3)	C

GRADE 13 FALL

COURSES	SITE
English-Composition	BC
Humanities	BC
Crop.S. 3--Trees & Vines	C
Ag. Bus. 2—Ag. Bus. Management (3)	BC
Elective (3)	BC/C

GRADE 14 FALL

COURSES	SITE
English	BC
Behaviorial Science (2)	BC
Physical Fitness (1)	BC
Crop.S. 5—Weed' Control (3)	C
Crop.S. 6—Soils (3)	C
Elective (3)	BC/C

GRADE 11 SPRING

COURSES	SITE
American History	HS
English	HS
Mathematics	HS
Physical Science or Chemistry	HS
Crop.S. 7—Irrigation (3)	C
Mech. Ag. 2--Equip. Ser. & Opr. (3)	C
Typing/Computer Intro.	ROP

GRADE 12 SPRING

COURSES	SITE
American Government	HS
English	HS
Conversational Spanish	HS
P.E. or Elective	HS
Technical Math (3)	C
Crop.S. 2—Alfalfa & For. Crop (3)	C

GRADE 13 SPRING

COURSES	SITE
English-Speech (3)	BC
Crop.S. 4—Ad. Trees Crops & Vines (3)	C
Mech. Ag. 6—Farm Fabrication (3)	C
Elective (3)	BC/C
Elective (3)	BC/C

GRADE 14 SPRING

COURSES	SITE
Humanities (3)	BC
Fine Arts (3)	BC
Physical Fitness (1)	BC
Crop.S. 8—Entomology (3)	C
Mech. Ag. 3—Farm Power (3)	C
Elective (3)	BC/C

CERTIFICATE OF COMPETENCY IN TYPING

HIGH SCHOOL DIPLOMA AND/OR CERTIFICATE OF COMPETENCY IN FIELD CROPS PRODUCTION UPON COMPLETION OF GRADE 12 SPRING SEMESTER

CERTIFICATE OF COMPETENCY IN TREE AND VINE CROPS AT THE END OF GRADE 13

ASSOCIATE OF SCIENCE DEGREE IN CROP PRODUCTION CERTIFICATE IN AGRONOMY

DIPLOMA/CERTIFICATE/DEGREE

WHERE COURSES WILL BE TAUGHT (SITE)

AGRICULTURE CENTER -- C
BAKERSFIELD COLLEGE -- BC
HIGH SCHOOL CAMPUS -- HS
REGIONAL OCCUPATIONAL PROGRAM — ROP

NO. OF COLLEGE UNITS INDICATED IN:

( )

SUGGESTED ELECTIVES

AGRICULTURE BUSINESS 3—AGRICULTURE MARKETING & ECONOMICS
AGRICULTURE BUSINESS 4—ACCOUNTING & FARM MANAGEMENT
AGRICULTURE BUSINESS 5--AGRICULTURE COMPUTERS
AGRICULTURE BUSINESS 6—AGRICULTURE LABOR RELATIONS
ANIMAL SCIENCE 1--INTRODUCTION TO ANIMAL SCIENCE
MECHANIZED AGRICULTURE 4--FARM ENGINES
MECHANIZED AGRICULTURE 5—FLUID & PNEUMATIC POWER
MECHANIZED AGRICULTURE 7—FARM TRACTORS
MECHANIZED AGRICULTURE 8—FARM SMALL ENGINES
ORNMENTAL HORTICULTURE 1—PLANT PROPAGATION
WELDING 1--OXY/ACETYLENE
WELDING 53B-ARC

MECHANIZED AGRICULTURE

GRADE 11 FALL COURSES	SITE	GRADE 12 FALL COURSES	SITE	GRADE 13 FALL COURSES	SITE	GRADE 14 FALL COURSES	SITE
American History	HS	American Government	HS	English-Composition (3)	BC	English-Technical Writing (3)	BC
English	HS	English	HS	Humanities (3)	BC	Behavorial Science (3)	BC
Mathematics	HS	Conversational Spanish	HS	Mech. Ag. 5—Fluid Pneumatic Power (3)	C	Physical Fitness (1)	BC
Physical Science or Chemistry	HS	P.E. or Elective	HS	Welding 530—ARC (3)	BC	Mech. Ag. 7—Farm Tractors (3)	C
Ag. Bus. 1--Intro. to Col. Ag. (3)	C	Technical Math (3)	C	Auto 1--Basic Auto (3)	BC	Elective (3)	BC/C
		Mech. Ag. 3—Farm Power (3)	C	Elective (3)	BC/C	Elective (3)	BC/C

GRADE 11 SPRING COURSES	SITE	GRADE 12 SPRING COURSES	SITE	GRADE 13 SPRING COURSES	SITE	GRADE 14 SPRING COURSES	SITE
American History	HS	American Government	HS	English-Speech (3)	BC	Humanities (3)	BC
English	HS	English	HS	Mech. Ag. 6—Farm Fabrication (3)	C	Fine Arts (3)	BC
Mathematics	HS	Conversational Spanish	HS	Mech. Shop 1--Elem. (3)		Physical Fitness (1)	BC
Physical Science or Chemistry	HS	P.E. or Elective	HS	Elective (3)	BC/C	Mech. Ag. 8—Farm Small Engines (3)	C
Mech. Ag. 1—Intro. to Ag. Mech. (3)	C	Technical Math (3)	C	Elective (3)	BC/C	Elective (3)	BC/C
Mech. Ag. 2--Equip. Ser. & Opr. (3)	C	Mech. Ag. 4—Farm Engines (3)	C				

CERTIFICATE OF COMPETENCY IN SERVICE AND OPERATION UPON COMPLETION OF GRADE 11, SPRING SEMESTER	HIGH SCHOOL DIPLOMA AND/OR CERTIFICATE OF COMPETENCY IN ENTRY LEVEL FARM MECHANICS	CERTIFICATE OF COMPETENCY IN FABRICATION AND REPAIR	ASSOCIATE OF SCIENCE DEGREE IN MECHANIZED AGRICULTURE

DIPLOMA/CERTIFICATE/DEGREE

WHERE COURSES WILL BE TAUGHT (SITE):

AGRICULTURE CENTER -- C
BAKERSFIELD COLLEGE -- BC
HIGH SCHOOL CAMPUS--HS
REGIONAL OCCUPATIONAL PROGRAM -- ROP

NO. OF COLLEGE UNITS INDICATED IN:

( )

SUGGESTED ELECTIVES

AGRICULTURE BUSINESS 2--AGRICULTURE BUSINESS MANAGEMENT
AGRICULTURE BUSINESS 5—AGRICULTURE COMPUTERS
ANIMAL SCIENCE 1--INTRODUCTION TO ANIMAL SCIENCE
CROP.S. 1--PRINCIPLES OF CROP PRODUCTION
CROP. S. 3--TREES & VINES
CROP. S. 6--SOILS
CROP. S. 7--IRRIGATION
CROP. S. 8—ENTOMOLOGY
ORNAMENTAL HORTICULTURE 4—PLANT IDENTIFICATION
AUTOMOBILE 102 B—AUTOMOBILE ENGINES MACHINERY
MACHINE SHOP 53D—ADVANCED MACHINE SHOP
MECHANICAL TECHNICAL 59A--BASIC HYDRAULIC FLUID MECHANICAL
WELDING 1--OXY/ACETYLENE
WELDING 74—TIG AND MIG

KERN HIGH SCHOOL DISTRICT AND BAKERSFIELD COLLEGE
ORNAMENTAL HORTICULTURE

GRADE 11 FALL

COURSES	SITE
American History	HS
English	HS
Mathematics	HS
Physical Science or Chemistry	HS
Ag. Bus. 1--Intro. to Cal. Ag. (3)	C

GRADE 12 FALL

COURSES	SITE
American Government	HS
English	HS
Conversational Spanish	HS
P.E. or Elective	HS
Technical Math (3)	C
Ag. Bus. 2--Ag. Bus. Management (3)	BC

GRADE 13 FALL

COURSES	SITE
English-Composition (3)	BC
Humanities	BC
Orn. Hort. 4--Plant Identification (3)	BC
Crop.S. 6--Soils (3)	C
Mech. Ag. 1--Intro. to Ag. Mech. (3)	C

GRADE 14 FALL

COURSES	SITE
English-Technical (3)	BC
Behavorial Science (3)	BC
Physical Science (3)	BC
Orn. Hort. 6--Landscape Cont./Maint. (3)	BC
Crop.S. 7--Irrigation (3)	C
Mech. Ag. 6--Farm Fabrication (3)	C

GRADE 11 SPRING

COURSES	SITE
American History	HS
English	HS
Mathematics	HS
Physical Science or Chemistry	HS
Orn. Hort. 1--Plant Propagation (3)	BC
Orn. Hort. 2--Nursery Management (3)	BC

GRADE 12 SPRING

COURSES	SITE
American Government	HS
English	HS
Conversational Spanish	HS
P.E. or Elective	HS
Technical Math (3)	C
Orn. Hort. 3--Plant Identification	BC

GRADE 13 SPRING

COURSES	SITE
English-Speech (3)	BC
Orn. Hort. 5--Land. Design (3)	BC
Crop.S. 8--Entolomogy (3)	C
Mech. Ag. 2--Ag. Equip. Ser. & Oper. (3)	C
Ag. Bus. 3--Ag. Marketing & Economics (3)	BC
Elective (3)	BC/C

GRADE 14 SPRING

COURSES	SITE
Humanities (3)	BC
Fine Arts (3)	BC
Physical Fitness (1)	BC
Orn. Hort. 7--Turf Management (3)	BC
Mech. Ag. 4--Farm Engines (3)	C
Ag. Bus. 5--Agriculture Computers (3)	BC
Elective (3)	BC/C

CERTIFICATE OF COMPETENCY IN PLANT CARE AND MAINTENANCE	HIGH SCHOOL DIPLOMA AND/OR CERTIFICATE OF COMPETENCY IN NURSERY MANAGEMENT UPON COMPLETION OF GRADE 12 SPRING SEMESTER	CERTIFICATE OF COMPETENCY IN LANDSCAPE DESIGN	ASSOCIATE OF SCIENCE DEGREE IN ORNAMENTAL HORTICULTURE AND/OR CERTIFICATE OR COMPETENCY IN LANDSCAPE MAINTENANCE/TURF

DIPLOMA/CERTIFICATE/DEGREE

WHERE COURSES WILL BE TAUGHT (SITE):

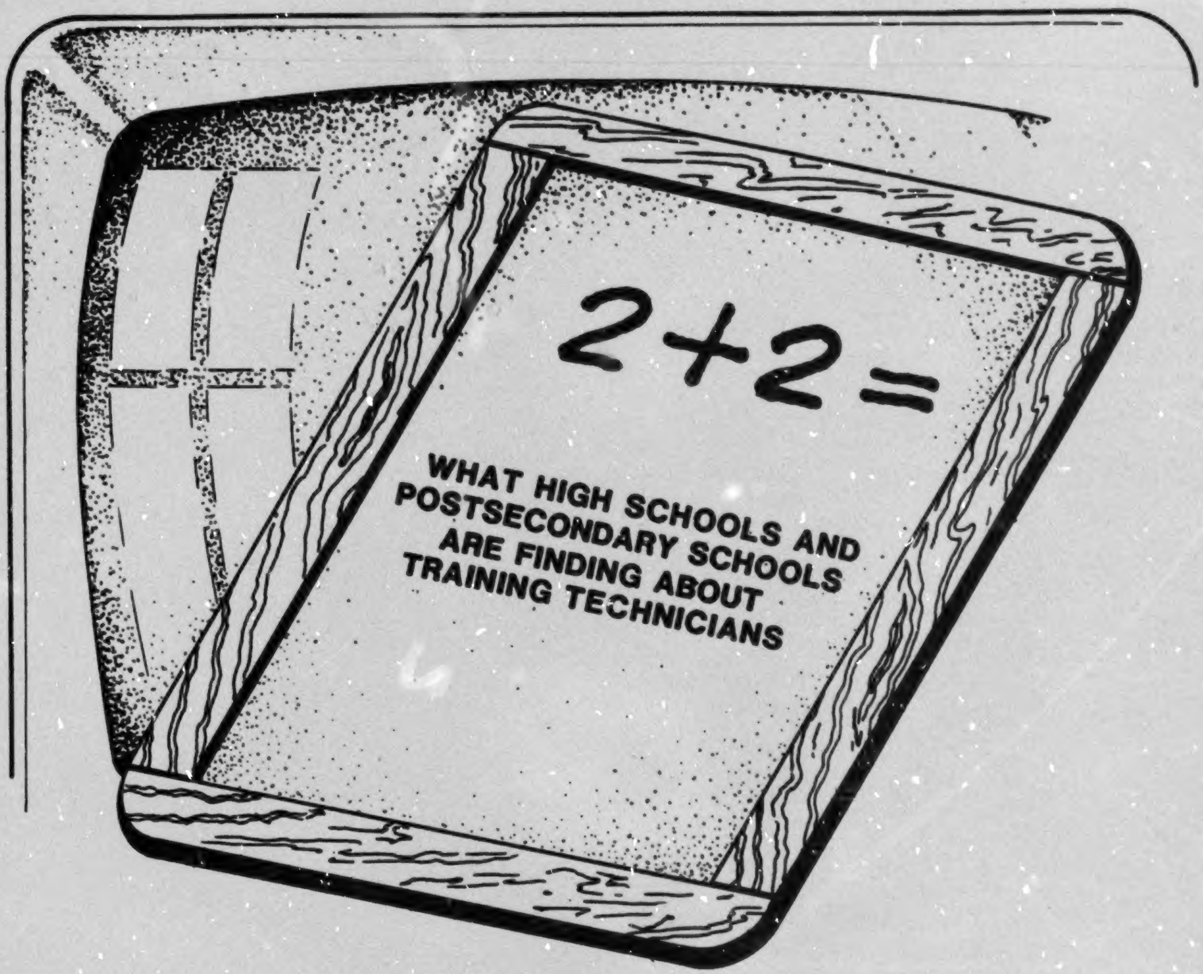
AGRICULTURE CENTER — C
BAKERSFIELD COLLEGE — BC
HIGH SCHOOL CAMPUS -- HS
REGIONAL OCCUPATIONAL PROGRAM — ROP

NO. OF COLLEGE UNITS INDICATED IN:

( )

SUGGESTED ELECTIVES

AGRICULTURE BUSINESS 4--AGRICULTURE ACCOUNTING & FARM MANAGEMENT
AGRICULTURE BUSINESS 6--AGRICULTURE LABOR RELATIONS
CROP.S. 5--WEED CONTROL
MECHANICAL AGRICULTURE 3--FARM POWER
MECHANICAL AGRICULTURE 5--FLUID & PNEUMATIC POWER
WELDING 1--OXY ACETYLENE
WELDING 530-ARC


2+2=
WHAT HIGH SCHOOLS AND
POSTSECONDARY SCHOOLS
ARE FINDING ABOUT
TRAINING TECHNICIANS

WHAT HIGH SCHOOLS AND POSTSECONDARY SCHOOLS ARE FINDING ABOUT TRAINING ADVANCED SKILLED WORKERS:

WE JUST CAN'T DO IT SEPARATELY!

Daniel M. Hull

Mr. Hull, President of the Center for Occupational Research and Development (CORD), is a registered engineer, having practiced over 13 years in areas of lasers and avionics prior to entering technical education research and development. Under his leadership, CORD has developed over 33,000 pages of instructional materials in emerging technical fields.

Educational reform is a subject of intense discussion in public, private, industrial and governmental circles throughout our country. People at every level in our educational sector are reacting to a general call for change. Most of the solutions proposed thus far specify that we ought to "return to the basics." What is really meant by this is that the country should return to a more traditional single track--a track that leads high school students toward a pursuit of baccalaureate degrees in universities.

A general concern for the decline of literacy in high school graduates is understandable. However, this concern should not culminate in a solution that leads all high school students through identical educational experiences. Such single-track programs, with emphasis on academic content and advanced degrees, will meet with predictable resistance because:

- Not all students are capable of pursuing (or are interested in) this form of education.
- Less than 30% of the jobs in this country between now and the end of the century require preparation through the baccalaureate degree.

High school vocational programs, as presently known, may change, but they will probably not cease to exist. Well-defined skills training for specific jobs will continue in vocational high schools, particularly in the service and craft areas.

Many of today's technicians' jobs have become extremely complex. Rapid advances in technology and the interdisciplinary nature of the work place require employees who are prepared in a more comprehensive manner. The need has become evident for advanced skilled workers who can operate and maintain a wide variety of sophisticated equipment, carry out precise, extensive procedures, and understand complicated technological processes.

As an example, consider the technician who works in a automated manufacturing facility. Ten years ago, this type of industry hired mostly skilled mechanics and electricians who could be adequately trained in vocational high schools or apprenticeship programs. Today, the requirement is for electromechanical technicians with broad, extensive background in applied math and physics, computers, telecommunications, robotics, electronics, computer-aided manufacturing methods, and so forth. This comprehensive skill and knowledge cannot be adequately provided in high school vocational programs alone.

What's happening to 40% to 50% of our high school students? It appears that the academic track and the skills training track can effectively serve only one of every two students of the high school population. Unless alternative programs or options are developed, schools will have done little to provide direction or interest for the remaining 50% of the high school students. This student population division is shown in Figure 1.

Postsecondary technical institutes and community colleges are reorganizing their curricula, laboratories and delivery systems to prepare technicians in associate degree programs. A mode of this curriculum is shown in Figures 2, 3, 4 and 5. These institutions are also experiencing frustrations because they just can't "cram into two years" all the instructional content that their students require.

The primary reason that two years doesn't provide enough time is that 90% to 95% of the students in these programs did not know they were headed there when they were in high school--and they did not prepare to enter the technician program. Inevitably this results in a "watered-down" content--or extension of the program duration to three years or longer. The alternative is for postsecondary institutions to raise their entrance requirements--which will probably eliminate many capable students because they are not properly prepared.

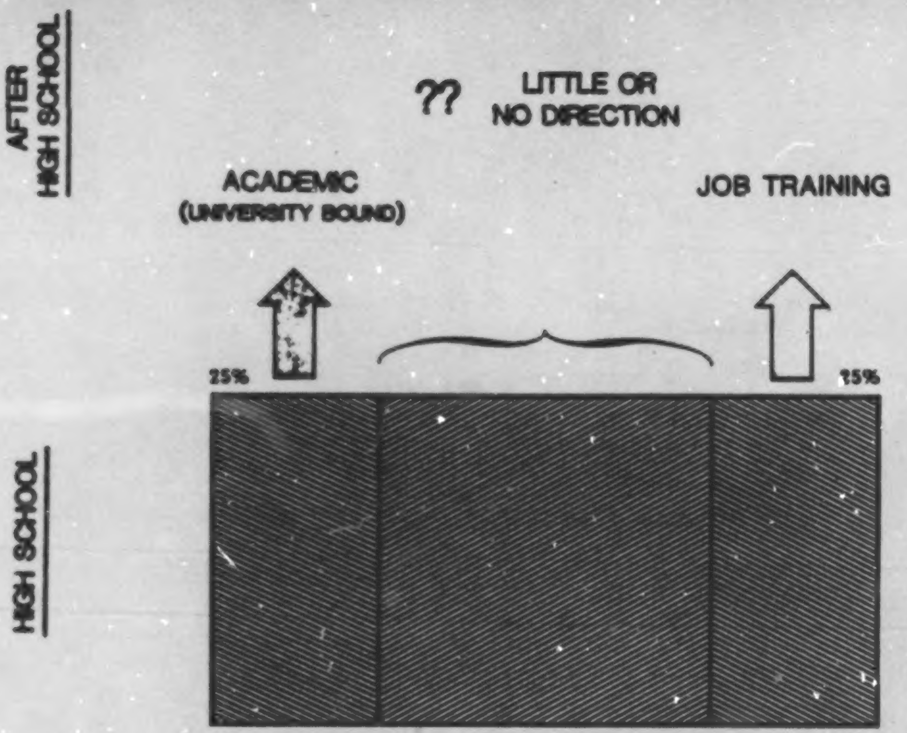


Fig. 1 Where are our high school students heading?

Traditionally, secondary school vocational educators have been concerned with training students for immediate employment upon graduation. This role has been significant, and well-defined skills training for specified jobs will continue to be an important function of vocational high schools, particularly in the service and craft areas. However, it appears that the academic track can service on 25% of our high school population, and the skills training track can service only 25%. Unless alternative programs are developed and/or improved, we will have done little to provide direction or interest to the central 50% of our high school students. Most of these students enter academic pursuits in postsecondary institutions (but do not complete the), or they attempt to enter the job market without specific preparation or experience.

Postsecondary occupational programs, in community colleges and technical institutes, offer excellent opportunities for valid career preparation. However, the students entering these programs are inadequately prepared. Consequently, the postsecondary programs are spending 30%-50% of the curriculum teaching what should have been taught in high school, or they are experiencing prohibitively high dropout rates.

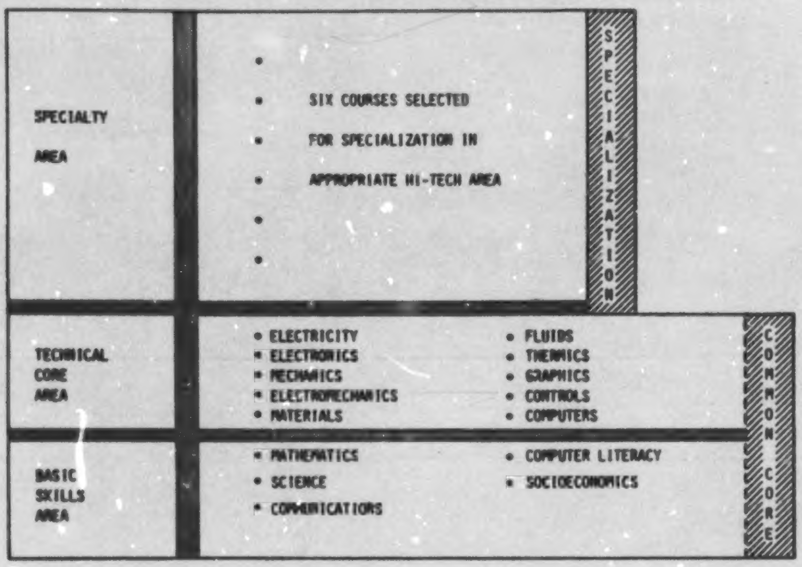

SPECIALTY AREA
SIX COURSES SELECTED
FOR SPECIALIZATION IN
APPROPRIATE HI-TECH AREA
SPECIALIZATION
TECHNICAL CORE AREA
ELECTRICITY
ELECTRONICS
MECHANICS
ELECTROMECHANICS
MATERIALS
FLUIDS
THERMICS
GRAPHICS
CONTROLS
COMPUTERS
BASIC SKILLS AREA
MATHEMATICS
SCIENCE
COMMUNICATIONS
COMPUTER LITERACY
SOCIOECONOMICS
COMMON CORE

Fig. 2 Proposed high-technology curriculum structure--general philosophy.

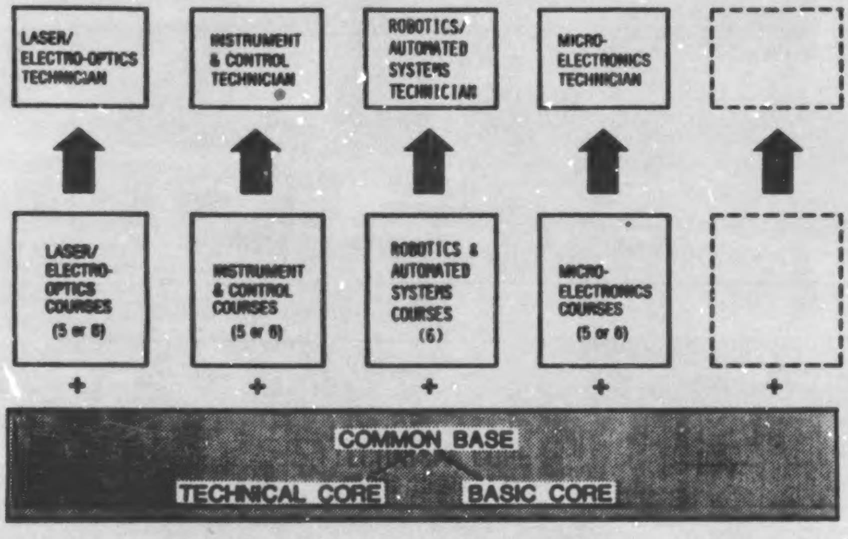

LASER/ ELECTRO-OPTICS TECHNICIAN
INSTRUMENT & CONTROL TECHNICIAN
ROBOTICS/ AUTOMATED SYSTEMS TECHNICIAN
MICRO-ELECTRONICS TECHNICIAN
LASER/ ELECTRO-OPTICS COURSES (5 or 6)
INSTRUMENT & CONTROL COURSES (5 or 6)
ROBOTICS & AUTOMATED SYSTEMS COURSES (6)
MICRO-ELECTRONICS COURSES (5 or 6)
+
+
+
+
+
COMMON BASE
TECHNICAL CORE
BASIC CORE

Fig. 3 High-technology curricula.

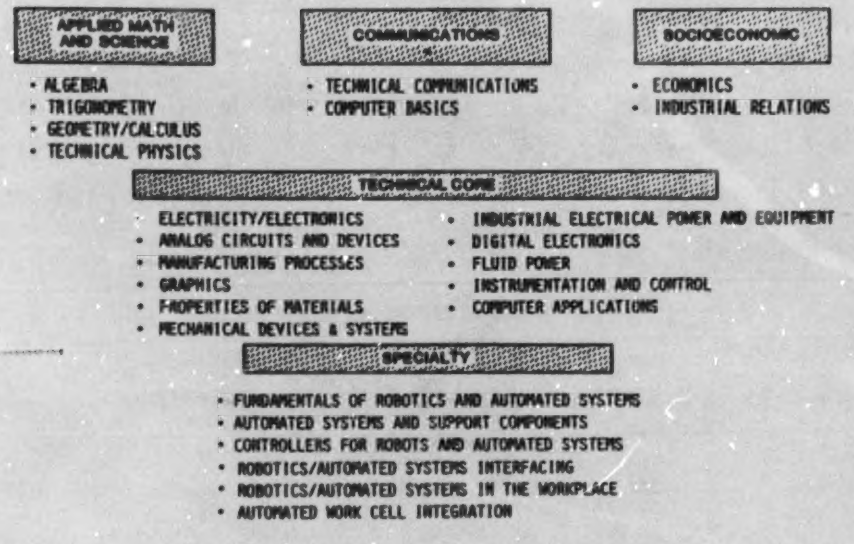

APPLIED MATH AND SCIENCE
COMMUNICATIONS
SOCIOECONOMIC
• ALGEBRA
• TRIGONOMETRY
• GEOMETRY/CALCULUS
• TECHNICAL PHYSICS
• TECHNICAL COMMUNICATIONS
• COMPUTER BASICS
• ECONOMICS
• INDUSTRIAL RELATIONS
TECHNICAL CORE
• ELECTRICITY/ELECTRONICS
• ANALOG CIRCUITS AND DEVICES
• MANUFACTURING PROCESSES
• GRAPHICS
• PROPERTIES OF MATERIALS
• MECHANICAL DEVICES & SYSTEMS
• INDUSTRIAL ELECTRICAL POWER AND EQUIPMENT
• DIGITAL ELECTRONICS
• FLUID POWER
• INSTRUMENTATION AND CONTROL
• COMPUTER APPLICATIONS
SPECIALTY
• FUNDAMENTALS OF ROBOTICS AND AUTOMATED SYSTEMS
• AUTOMATED SYSTEMS AND SUPPORT COMPONENTS
• CONTROLLERS FOR ROBOTS AND AUTOMATED SYSTEMS
• ROBOTICS/AUTOMATED SYSTEMS INTERFACING
• ROBOTICS/AUTOMATED SYSTEMS IN THE WORKPLACE
• AUTOMATED WORK CELL INTEGRATION

Fig. 4 Curriculum model for Robotics/Automated Systems Technology.

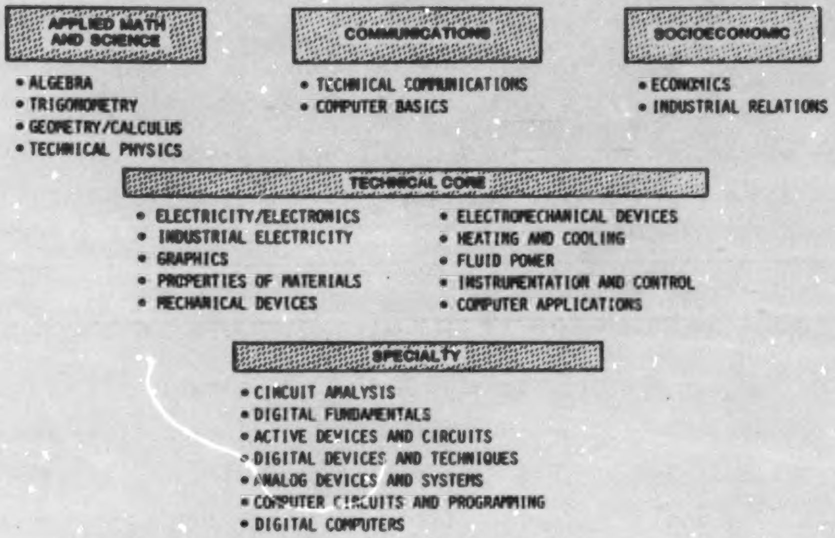

APPLIED MATH AND SCIENCE
COMMUNICATIONS
SOCIOECONOMIC
• ALGEBRA
• TRIGONOMETRY
• GEOMETRY/CALCULUS
• TECHNICAL PHYSICS
• TECHNICAL COMMUNICATIONS
• COMPUTER BASICS
• ECONOMICS
• INDUSTRIAL RELATIONS
TECHNICAL CORE
• ELECTRICITY/ELECTRONICS
• INDUSTRIAL ELECTRICITY
• GRAPHICS
• PROPERTIES OF MATERIALS
• MECHANICAL DEVICES
• ELECTROMECHANICAL DEVICES
• HEATING AND COOLING
• FLUID POWER
• INSTRUMENTATION AND CONTROL
• COMPUTER APPLICATIONS
SPECIALTY
• CIRCUIT ANALYSIS
• DIGITAL FUNDAMENTALS
• ACTIVE DEVICES AND CIRCUITS
• DIGITAL DEVICES AND TECHNIQUES
• ANALOG DEVICES AND SYSTEMS
• COMPUTER CIRCUITS AND PROGRAMMING
• DIGITAL COMPUTERS

Fig. 5 Curriculum model for Computer Technology.

These kinds of problems are typical of, but not exclusive to, other high-tech curricula. Similar situations are being experienced in the skill trades, CAD drafting, health fields, automated office occupations, and others. Significant changes in program content are required to ensure that graduates with Associate of Science degrees enter the work force with important types of mastery. These are:

- Systems Orientation--Not confined to a narrow technical specialization
- Interdisciplinary Emphasis--Possessing a combination of skills
- Strong Technical Base--Possessing sufficient knowledge of applied math and science to enable mastery of new facts, skills and procedures as technology changes

Postsecondary curriculum models developed to meet these goals are being adapted for use in institutions throughout the country. They require that students take a concentration of math (through trigonometry, analytic geometry and precalculus) and applied physics. The success of these programs is limited because students entering technical programs at the postsecondary level are deficient in math, science and computer skills. They are deficient in math and science because--coming from the broad middle of the high school population shown in Figure 1--they were neither directed not prepared to pursue technical careers. As a result, many chose the path of least resistance and avoided, to the extent possible, the available math and science courses.

Many vocational educators are convinced that students cannot be adequately prepared at the high school level to enter most technician occupations. The more advanced jobs in modern industries require technicians with education beyond the high school level. Today vocational educators recognize that one successful outcome of a high school vo-tech program--for a certain fraction of the high school population--is student placement in a postsecondary technician program.

2+2 ARTICULATION IS A NEW DIRECTION WITH REWARDING OUTCOMES

Significant interest has arisen in developing a 2+2 (high school/postsecondary) articulation process for vo-tech or occupational education programs. Articulation has been defined in several ways, as shown in enclosure "A". Simply stated, 2+2 articulation is an agreement between a high school and a postsecondary institution that enables a student to begin pursuing an associate degree (or its equivalent) while that student is still in high school. Under the proper conditions, credit for certain high school courses is given by the postsecondary (degree granting) institution. This process can provide students with more direction, better preparation for entry into community colleges, and time for co-op or work experiences during the program of study.

Think what we could do if students were enrolled in carefully-designed four-year programs to prepare for these advanced skilled occupations. The students would be given:

- Something new and exciting in high school--a new career path for 20-30% of students.
- 2+2 may equal 3 years--maybe eliminate one year of course work or have time for co-op experiences.

Secondary schools would be provided:

- Room for reinforcing basics in math, science, communications, computers, and so forth in a more relevant way.
- New image and purpose for voc-ed

Benefits for the postsecondary institution would be:

- New and greater source of qualified students entering postsecondary (high-tech) programs.
- Higher level of tech grads.
- Opportunity for co-op training.

State and community would benefit by:

- More efficient use of tax dollars due to elimination of redundancy in labs/equipment, and qualified faculty (overlapping in secondary voc-ed and community colleges).

2+2 articulation is a new direction with rewarding outcomes for a group of students who currently have little direction. These four years should be grades 11, 12, 13 and 14.

Evolutionary development has resulted in the perception that articulation is a process, an attitude, and a goal. Many definitions of articulation have been proposed. The following review of those defintions can assist you in forming a more comprehensive and concrete image of the articulation concept.

The following definitions of articulation place an emphasis upon the process or processes of articulated programs:

-- the act of interrelating or fitting into a systematic whole; fitting education into the larger community (Bushnell, 1977).

-- the total effort of educational groups and individuals to discover, establish, and continually improve relationships between policies, plans, procedures, programs, and people (Planning for Continuous Occupational Education Programs, 1975). Any attempt to improve articulation without first focusing on people problems will be unproductive (Fedderson, 1977, based on Planning for Continuous Occupational Education Programs, 1975).

-- communication, cooperation, and coordination within and between schools (Greeson, 1979).

-- coordination, interfacing, cooperation, understanding, acquainting, writing, combining, knowing, involving; a continuous recycling of sequences or phases that need to occur because change takes place in people, society and educational programs (Zane, 1973).

The value of these definitions is apparent. However, they tend to ignore the reason for articulation--that is, the student. Many documents discuss and define articulation in terms of the goal of articulation; that is, facilitation of transition for the student. The following are some examples:

-- the planned process within the educational system which considers the transition of students from the secondary to the postsecondary levels of instruction and allows the students to move with continuity and without hindrance and duplication through the levels of the education process (A Study of the Articulation of Occupational Education Programs in New York, no date).

-- planned process which facilitates the transition of students from secondary to postsecondary levels of instruction without unnecessary duplication or gaps in instruction, or hindrance to the process (Berg, 1979, based on Articulation: A study by the National Advisory Council on Vocational Education, 1976).

-- how a student's educational progression through the high school and community college levels (can) be most productively and expeditiously coordinated; a concept and process which current educational literature has frequently termed articulation (Schlieman, 1976).

-- the relationships between educational programs which provide a smooth transition for a student moving either horizontally or vertically between programs (Heuchert, 1975).

-- a planned process linking two or more educational systems to help students make a smooth transition from one level of instruction or institution to another without delays or loss of credit (Bushnell, 1978).

-- the planned process within the educational system which facilitates the transition of students between secondary and postsecondary levels of instruction. It enables students to move with continuity and without hindrance through various levels of the education process (Farah, 1978).

Many additional definitions address themselves to both the process and the goal and/or objective(s) of articulation. The earliest recorded definition of educational articulation this study found is from the Seventh Yearbook, American Association of School Administrators, 1929, and includes both process and goal:

-- that adequate relation of part to part which makes for continuous forward movement (Blanchard, 1972).

The following are additional definitions that include statements about process and goal/objective(s):

-- the process of transfer and progression of students from one level of educational offering to the next. It may be regarded as the extent to which the various levels of the education system are so interrelated as to provide for continuous educational progress of students with a minimum of repetition and a maximum of efficiency (Oregon State Board of Education, 1968).

-- the manner in which the classroom instruction, curricular activities, and instructional services of the school system are interrelated and interdependent, the aim being to facilitate the continuous and efficient education program of the pupils (e.g., from one grade to the next; from elementary to secondary school; from secondary school to college), to interrelate various areas of the curriculum (e.g., Fine Arts and Language Arts) and/or to interrelate the school's instructional institutions (e.g., the home, church, youth groups, and welfare services). From Handbook VI, National Center for Educational Statistics, 1970 (Bender, 1973).

- an interconnectiveness forming a perfect system without loss of identity or distinctiveness of the separate parts or units. Thus, articulation would encompass an organizational structure whose component parts fit into each other to form a cohesive system of educational opportunity (Bender, 1973).

- articulation refers to the relationships between education programs which are designed to provide a smooth transition for the student from one educational program to another. This movement of the student between programs can be either horizontal or vertical (McKinnerney, 1974).

- arrangement of components of various levels of vocational education in a connected sequence so that individuals choosing more than one level of instruction can move on to the next level without either gap or overlap in curriculum (Burger, 1974).

- the multi-dimensional process of dovetailing institutional operations and responsibilities to enhance progression of students in curriculum areas from one level (high school) to another (community colleges) and maximize resources. Articulation must be an on-going process which may be carried out in concert with initial program planning but also after programs are already operational (Opachinch, 1974).

- "the organization of classroom instruction, co-curricular activities and other interdependent and interrelated services of the school system so as to facilitate the continuous and efficient educational process of students from grade to grade and from school to school,--also, the interrelation of the school's instructional program with the educational programs of other available institutions or work opportunities." (*Good's Dictionary of Education*, quoted by Canup, 1975).

- a systematic process within and between educational systems that will facilitate the movement of students from one educational level or grade to the next, based on the interrelationship of the programs involved. The primary objective of this activity is to provide for the development of a continuum of education to allow each student to develop to his full potential without unnecessary duplication of instruction and delay in attaining his educational and career objectives (Canup, 1975).

- articulation is communication, coordination and cooperation between secondary and postsecondary educators designed to pave the way for the smooth progress of students through their education to a place in the world of work (Spanbauer, 1977).

-- the action resulting from policies and procedures employed to provide for:

  1. vocational/occupational program alignment and continuity in a given occupational area between high schools and postsecondary institutions conducting the program;
  2. skills and related technical information required by the student to achieve a smooth transition through the various levels of educational experience in that program;
  3. transition of the student from one educational level to another in a given occupational area without unnecessary administrative delay or duplication of effort; and
  4. improved communication and cooperation between institutions, school systems, and communities at both local area and state levels, that share interest in the same occupational program(s) (Woelfer, 1978).

-- process utilized for communicating and sharing cooperatively to enhance the effective delivery system in programs and services for the benefit of the student (Project MAVE, 1978).

-- the coming together of people and materials representative of different segments of the educational community for the purpose of sharing information and possibly of active collaboration in spheres of common concern (Farah, 1978).

-- cooperation among and within public and private sectors which promotes learner progress through education that prepares, with maximum efficiency, the individual with the knowledge and skills necessary for entry or upgrading in paid or unpaid occupations (State of Alaska, Department of Education, 1979).

ARTICULATION AND 2+2 HIGH-TECH PROGRAMS

Coordination between secondary and postsecondary vocational programs is not a new idea; neither it is a widely practiced one. The concept of articulation has been discussed frequently in recent years--with articulation often being defined as the planned process within an education system that allows students to move from one level of schooling to another without duplication of coursework. More broadly, articulation may be defined as the result of policies and procedures that provide for:

- Alignment of programs between and among high schools and institutions of the community college system.
- Acquisition of skills and other related information to ensure a smooth transition through the various education levels.
- Elimination of unnecessary delay and duplication of effort in the transition from one education level to another.
- Enhancement of cooperation and unity among the educational institutions, business and industry, and communities at both the state and local levels. (McCormick, 1980.)

A supporting definition has also been stated by Cone and Hardy as follows:

> Articulation can be characterized as a process, an attitude, and a goal. As a process, it is the coordination of policies and practices among sectors of the education system to produce a smooth flow of students from one sector to another. As an attitude, it is exemplified by the willingness of educators in all sectors to work together to transcend the individual and institutional self-interest that impedes the maximum development of the student. As a goal, it is the creation of an educational system without artificial divisions, so that the whole educational period becomes one unbroken flow, which varies in speed for each individual, and which eliminates loss of credit, delays and unnecessary duplication of effort. (Cone and Hardy, 1979.)

Linked to competency-based education, articulation is seen as a means of increasing the effectiveness and accountability of vocational-technical programs while reducing costs and duplication of effort. Articulation is especially appropriate in vocational technician training.

ENCLOSURE A

DEFINITION OF ARTICULATION AND RELATED TERMS

Articulation may be defined as the result of policies and procedures that provide for:

1. Alignment of programs between and among high schools and institutions of the community college system
2. Acquisition of skills and other related information to ensure a smooth transition through the various educational levels
3. Elimination of unnecessary delay and duplication of effort in the transition from one educational level to another
4. Enhancement of cooperation and unity among the educational institutions, business and industry, and communities at both the state and local levels (McCormick, 1980)

A supporting definition has also been stated by Cone and Hardy as follows:

> Articulation can be characterized as a process, an attitude, and a goal. As a process, it is the coordination of policies and practices among sectors of the education system to produce a smooth flow of students from one sector to another. As an attitude, it is exemplified by the willingness of educators in all sectors to work together to transcend the individual and institutional self-interest that impedes the maximum development of the student. As a goal, it is the creation of an educational system without artificial divisions, so that the whole educational period becomes one unbroken flow, which varies in speed for each individual, and which eliminates loss of credit, delays and unnecessary duplication of effort.
> (Cone and Hardy, 1979)

It is important to clarify the term "vocational" education at both the secondary and postsecondary levels as used in this report.

SECONDARY

Vocational education in the public secondary schools is a total program that (1) is capable of meeting the individual needs, interests, abilities, and aspirations of each student, and (2) is realistic in light of actual or anticipated opportunities for gainful employment, advanced education, and practical life applications. Specifically, the purposes of vocational education are:

1. To prepare individuals for entry-level employment in recognized occupations, new occupations, and emerging occupations at various levels of competence.

2. To prepare individuals for participation in advanced or highly skilled postsecondary vocational and technical education.

3. To provide individuals with laboratory experiences and activities that

assist them in the making of informed and meaningful occupational choices, and/or that serve as the foundation for skilled vocational-technical education.

4. To provide individuals with laboratory experiences and activities that assist them in the making of informed consumer decisions and in the application of practical life skills.

Supporting purposes of the program are: to provide appropriate programs for persons who have left high school and who are available for study, and to provide appropriate vocational programs and/or supportive services for persons who have academic, socioeconomic, and/or other disadvantages or handicaps that prevent them from succeeding in regular programs.

POSTSECONDARY

Vocational education in the community college system is grouped into two distinct categories, vocational and technical.

1. Vocational programs are designed to train people to enter skilled occupations. These programs may vary in length, depending upon the development of skills and job proficiency. Curricula leading to a diploma require a minimum of 64 credit hours and include courses in communication skills and social sciences that are directly related to the occupational goals of the program. Vocational programs are designed to prepare a person at the entry level.
2. Technical programs prepare students for entry-level jobs as technicians. The technician usually works in close cooperation with and under the direct supervision of a professionally trained person. With experience, many technicians move into professional and managerial positions. Students enrolled in the technical programs, in addition to taking courses that are occupational in nature, take general education courses in the areas of English, mathematics, science and social science. Technical programs lead to the Associate in Applied Science degree (AAS) and are a minimum of 96 credit hours in length. Technical programs are designed primarily for entrance into employment, not for college transfer. Certain courses and programs in the technical area, however, may be accepted by a four-year college or university for transfer credit.

For purposes of this report, the term "vocational/technical" will refer to programs at both levels as clarified above.

Excerpts from "Articulation of Secondary/Postsecondary Vocational/Technical Programs," a report by the Joint Committee on Articulation, North Carolina Council of Local Administrators and North Carolina Association of Community College Instructional Administrators, March 1982, pp 1-2.

FOUR CHARACTERISTICS OF HIGH TECHNOLOGY

- Broad knowledge base
- Rapid change
- Heavy computer use
- Systems orientation

"SUPERTECHS" FOR HIGH TECHNOLOGY

- SYSTEMS ORIENTED
- COMBINATION OF SKILLS — INTERDISCIPLINARY
  - ELECTRICAL
  - MECHANICAL
  - THERMAL
  - OPTICAL
  - MICROCOMPUTERS
- STRONG TECHNICAL BASE
  - CAPABLE OF LEARNING NEW SPECIALTIES AS THE TECHNOLOGY CHANGES

TECHNICIANS PERFORM THE FOLLOWING KINDS OF TASKS:

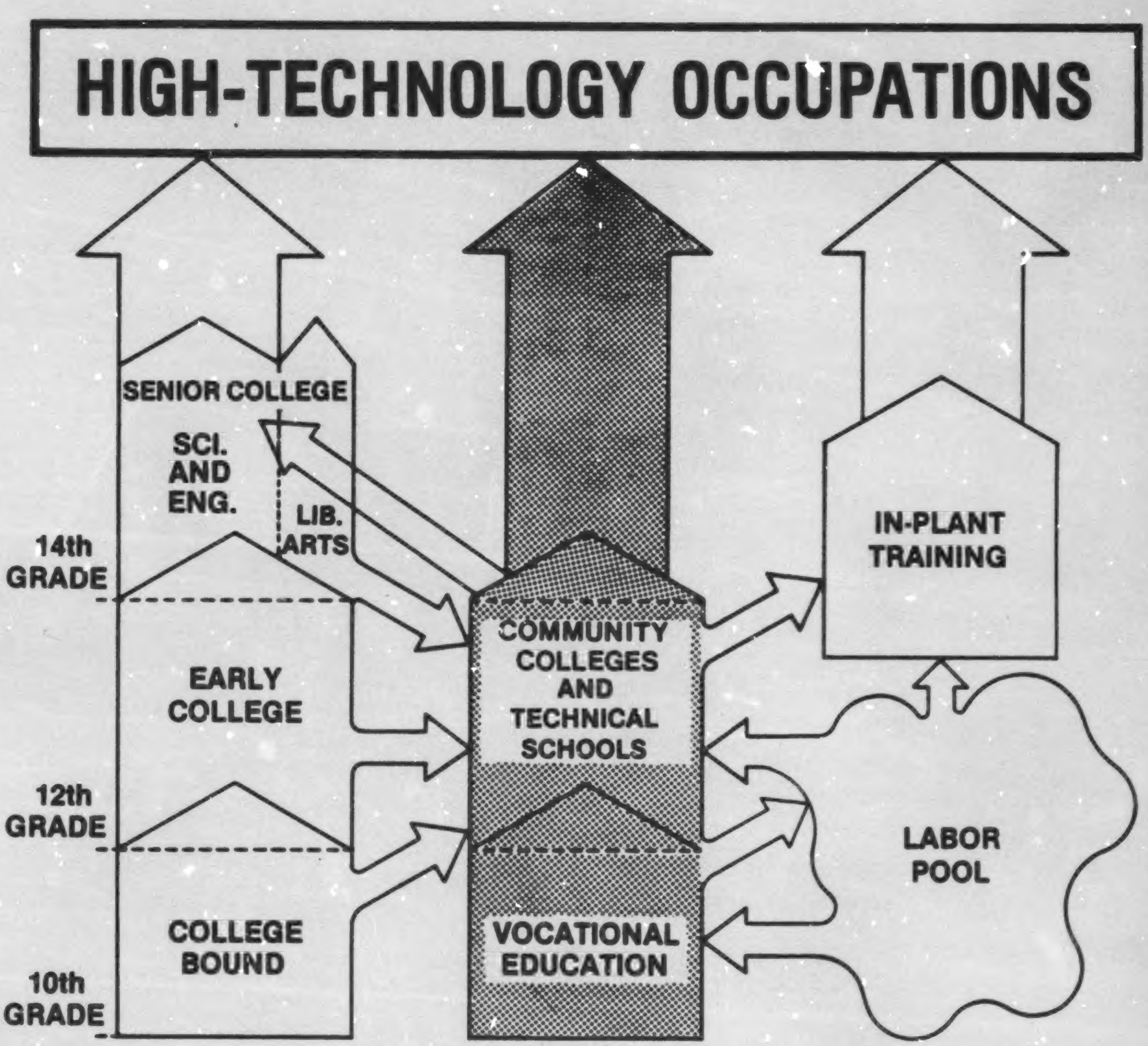
1. PERFORM TESTS ON MECHANICAL, HYDRAULIC, PNEUMATIC, ELECTRICAL, OR THERMAL COMPONENTS OR SYSTEMS; PREPARE APPROPRIATE TECHNICAL REPORTS COVERING THE TESTS.
2. OBTAIN, SELECT, COMPILE, AND USE TECHNICAL INFORMATION FROM PRECISE MEASURING AND RECORDING INSTRUMENTS.
3. ANALYZE AND INTERPRET INFORMATION OBTAINED FROM PRECISE MEASURING AND RECORDING INSTRUMENTS AND SPECIAL PROCEDURES AND TECHNIQUES.
4. PREPARE OR INTERPRET ENGINEERING DRAWINGS AND SKETCHES; WRITE DETAILED SPECIFICATIONS OR PROCEDURES FOR WORK.
5. DESIGN, HELP DEVELOP, OR MODIFY PRODUCTS, TECHNIQUES, AND APPLICATIONS IN INDUSTRIAL SETTINGS.
6. PLAN, SUPERVISE, OR ASSIST IN THE INSTALLATION AND INSPECTION OF COMPLEX SCIENTIFIC APPARATUS, EQUIPMENT, AND CONTROL SYSTEMS.
7. OPERATE, MAINTAIN, AND REPAIR COMPLEX APPARATUS AND EQUIPMENT WITH EXTENSIVE CONTROL SYSTEMS.
8. ADVISE, PLAN, AND ESTIMATE COSTS AS A FIELD REPRESENTATIVE OF A MANUFACTURER OR DISTRIBUTOR OF TECHNICAL APPARATUS, EQUIPMENT, SERVICES, AND/OR PRODUCTS.
9. APPLY KNOWLEDGE OF SCIENCE AND MATHEMATICS WHILE PROVIDING DIRECT TECHNICAL ASSISTANCE TO PHYSICAL SCIENTISTS OR ENGINEERS ENGAGED IN SCIENTIFIC RESEARCH AND EXPERIMENTATION.

HIGH-TECHNOLOGY CAREERS FOR TECHNICIANS

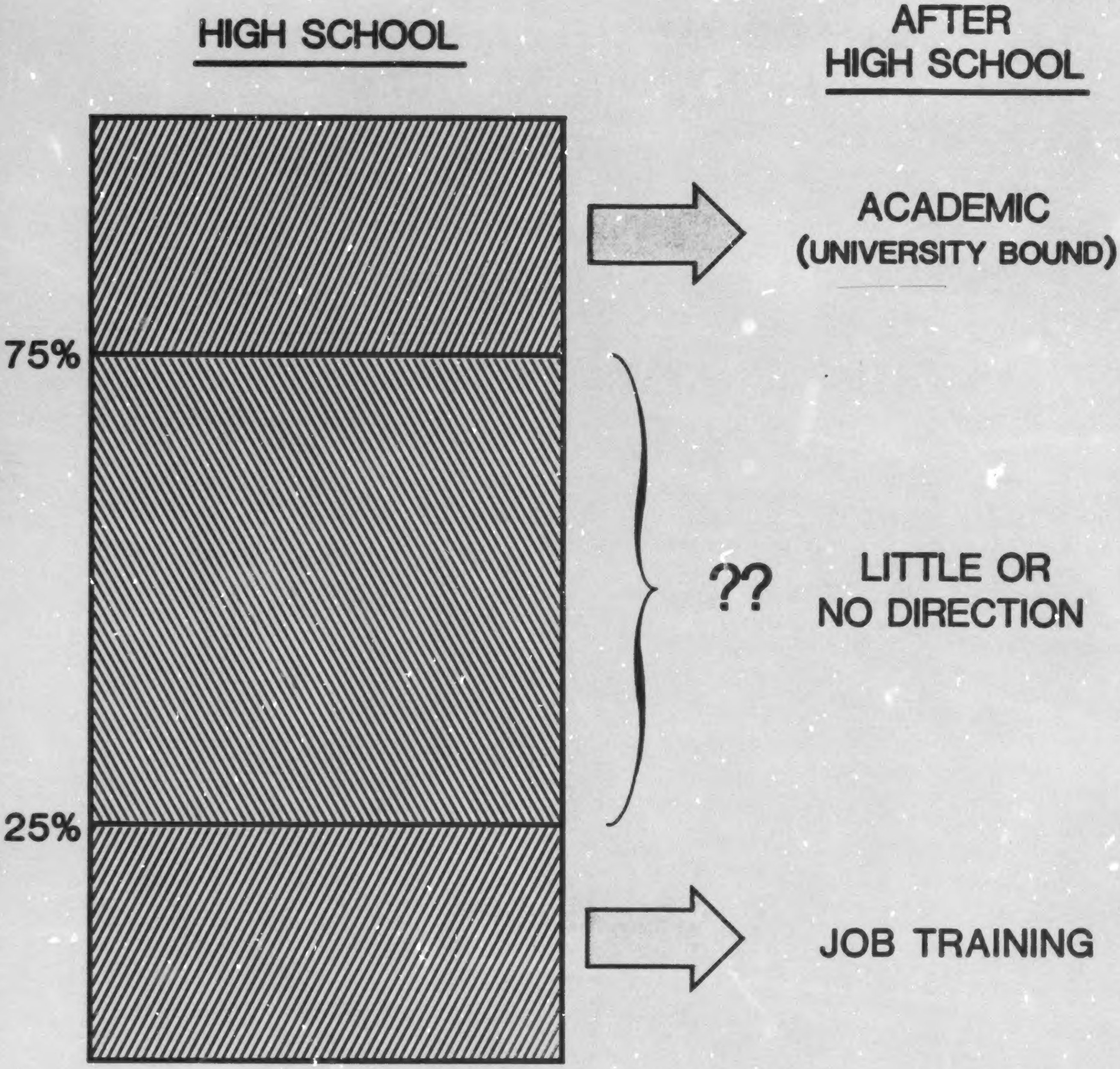
- COMPUTERS
- MICROELECTRONICS
- TELECOMMUNICATIONS
- COMPUTER-AIDED DESIGN
- ROBOTICS
- COMPUTER NUMERICAL CONTROL
- AUTOMATED MANUFACTURING
- NONDESTRUCTIVE TESTING
- INSTRUMENTATION AND CONTROL
- LASERS
- ENERGY CONSERVATION AND USE
- BIOMEDICAL ELECTRONICS

OVERALL REACTION TO HIGH-TECH PROGRAM

- YOU CAN'T DO IT IN TWO YEARS WITH THE TYPE OF STUDENTS WE ARE GETTING
- THE AVERAGE STUDENT IS NOT PREPARED TO ENTER THIS PROGRAM
- WHEN THEY WERE IN HIGH SCHOOL, 95% OF OUR STUDENTS DID NOT KNOW THEY WOULD BE COMING HERE FOR THIS TRAINING


HIGH-TECHNOLOGY OCCUPATIONS
SENIOR COLLEGE
SCI. AND ENG.
LIB. ARTS
14th GRADE
EARLY COLLEGE
12th GRADE
COLLEGE BOUND
10th GRADE
COMMUNITY COLLEGES AND TECHNICAL SCHOOLS
VOCATIONAL EDUCATION
IN-PLANT TRAINING
LABOR POOL

WHERE ARE OUR HIGH SCHOOL STUDENTS HEADED ?


HIGH SCHOOL

AFTER HIGH SCHOOL

75%

25%

ACADEMIC (UNIVERSITY BOUND)

?? LITTLE OR NO DIRECTION

JOB TRAINING

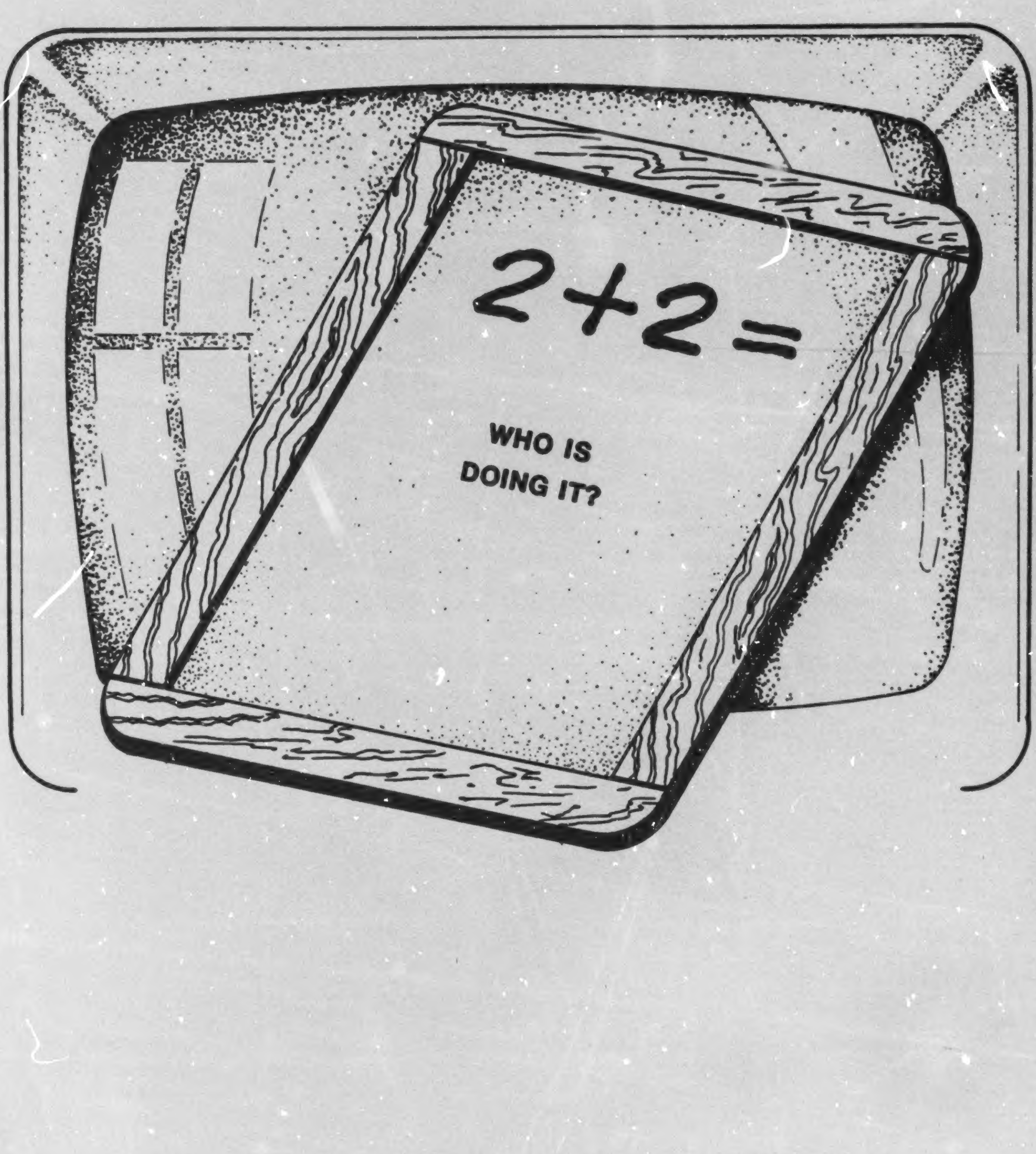
ARTICULATION –

THE RESULT OF POLICIES AND PROCEDURES FOR:

- ALIGNING PROGRAMS BETWEEN SECONDARY AND POSTSECONDARY INSTITUTIONS
- ACQUIRING SKILLS AND OTHER RELATED INFORMATION FOR SMOOTH TRANSITION THROUGH VARIOUS EDUCATIONAL LEVELS
- ELIMINATING DELAY AND DUPLICATION WHEN MOVING FROM ONE EDUCATIONAL LEVEL TO ANOTHER
- COOPERATION AND UNITY AMONG EDUCATIONAL INSTITUTIONS, BUSINESS, INDUSTRY AND COMMUNITIES

IT IS

- A PROCESS
- AN ATTITUDE
- A GOAL


2+2=
WHO IS DOING IT?

ARTICULATION OF TECHNICAL PROGRAMS AT OKLAHOMA CITY SCHOOLS, OKLAHOMA CITY VOCATIONAL-TECHNICAL DISTRICT, FRANCIS TUTTLE VOCATIONAL-TECHNICAL CENTER, AND OKLAHOMA CITY COMMUNITY COLLEGE

Dr. Jack Isch
Oklahoma City, Oklahoma

Dr. Isch took his undergraduate work at Central State University and received his graduate degrees from the University of Oklahoma. He taught school in the Durant and Oklahoma City School Districts, served as an intern to the Superintendent of Schools in Oklahoma City, and worked as a graduate research assistant at OU. Dr. Isch currently serves as Special Assistant to the Superintendent in Oklahoma City. In this position, he is responsible for the district's vocational, business, industrial arts, health education and community education programs, as well as representing the district's position to the state and national legislatures and education departments. In addition to these duties, Dr. Isch serves on a number of community advisory committees such as Community Council and Boy Scouts.

PRESENTATION OUTLINE

I. Background and Need
II. Articulation Project Description
III. Establishing Articulation
IV. Problems Encountered
V. Preliminary Plan
VI. Benefits

I. BACKGROUND AND NEED

The need for a high-tech training program in Oklahoma City, Oklahoma, was substantiated by a survey conducted by Francis Tuttle Vocational-Technical School, Oklahoma City, Oklahoma, and by a survey conducted locally, statewide, and nationally by the Oklahoma City Public Schools. Both surveys indicated that there was a need to provide training for careers in the technical areas of: (1) Biomedical Equipment; (2) Computer Assisted Drafting; (3) Industrial Plant Maintenance; (4) Computer Application; (5) Instrumentation and Control; (6) Automated Manufacturing; and (7) Electronics/Telecommunications. It is the intent of the participating institutions to develop articulated curricula in all of these areas.

Although it is possible to establish a training program solely at the postsecondary level, it was recognized that it would be beneficial to students, and business and industry, if some type of program was established at the secondary level. Graduating high school students who have completed a number of technical courses provide a pool of well-qualified students who can complete a program at the postsecondary level in a shorter period of time.

In addition, administrators in the institutions involved in this effort recognized that all of the training programs could not be provided by one single institution because of the cost and lack of facilities.

II. ARTICULATION PROJECT DESCRIPTION

The presenter, Dr. Jack Isch, Director of Vocational-Technical Education in Oklahoma City Public Schools, working with the State Department of Vocational-Technical Education, requested funds from the state to develop an articulated curricula program in Oklahoma City. In 1983, the Oklahoma City School District was awarded a grant to carry out the project.

Chief executive officers in the following organizations were contacted to discuss the possibility of working together on the project: (1) Oklahoma City Vocational-Technical District; (2) Francis Tuttle Vocational-Technical District; and (3) Oklahoma City Community College. Each CEO agreed upon the need for and their institution's interest to participate in the program. Later, another Vocational-Technical district, Eastern Oklahoma County joined the project.

Although Oklahoma City is not blessed with an abundance of "high-tech" industries, there are a number of companies currently installing equipment which will require technicians to operate and maintain. Administrators involved in the project agree that many students initially may have to seek employment outside the state but do not see this as a major obstacle.

The Oklahoma City Public School District is similar to other urban school districts nationwide with an enrollment of approximately 40,000 students. The student body is composed of approximately 50 percent minorities. Achievement scores are slightly above the national norms. It is anticipated that there will be sufficient students interested in the "high-tech" program to support it.

III. ESTABLISHING ARTICULATION

The establishment and implementation of articulated curricula requires effort and input from a variety of individuals and organizations. Coordination of efforts has been enhanced by forming committees responsible for developing specific portions of the articulation plan. Five committee groups being used are as follows: (1) Leadership; (2) Procedural; (3) Advisory; (4) Curriculum Development; and (5) Evaluation. In addition, the Center for Occupational Research and Development (CORD), Waco, Texas, was employed to assist in the project.

The Leadership Committee consists of the Chief Executive Officers (CEO) of the participating institutions. The Leadership Committee was responsible for two major tasks. One major task was to make a commitment to articulate curricula between secondary and postsecondary schools. The other task will be to endorse and implement the articulation plan. The Leadership Committee has not been directly involved with the "hands-on" development of the articulated curricula. The Leadership Committee established a Procedural Committee which was given the authority and responsibility for developing the articulation plan. The Leadership Committee meets during the establishment phase only when policy decisions are required. It is expected they will meet on an annual basis to review the articulation plan and, if appropriate, endorse the plan and continue its operation. This will reaffirm the commitment of the institutions to maintain the articulation program, maintain the level of instruction provided to the students, and encourage students to participate in the articulated program.

The Procedural Committee consists of at least one administrator from each participating institution as assigned by each institutional CEO. The Procedural Committee is responsible for developing guidelines, procedures, and cooperative agreements for establishing articulated programs within the schools, and coordinating activities of the participating institutions.

One issue the Procedural Committee addressed early was to establish a specific date for placing an articulated curriculum in effect. Establishing the implementation date facilitates the development of a project schedule indicating time frames during which individual project tasks must be completed. The first phase of implementation was started this fall (1984) at a designated high school in the Oklahoma City School District. It is planned to offer additional courses at the secondary level beginning in the fall of 1985.

The Procedural Committee is in the process of identifying and resolving administrative articulation issues. Many of these issues address the curricula of each school. (The Procedural Committee has established a Curriculum Development Committee to help resolve issues such as: what courses should be taught at each level; which curriculum should be articulated; what courses will be eligible for articulated credit; and what competencies will be taught at each level.)

Acting on Curriculum Development Committee recommendations, the Procedural Committee will endorse curriculum and courses for articulation. Specifying the courses to be articulated enables the Procedural Committee to designate which institution will offer the course. The designation will be based upon consideration of at least the following factors:

1. Which institution offers better facilities for teaching the course?
2. Which faculty member should teach the course?
3. How will current and future students be affected by the choice?
4. What are the prospects for attracting students to the program?

Although the institutions involved had not entered into a formal articulation agreement at this time, it is their desire to avoid replicating the facility, materials and equipment of another nearby school, and to provide a smooth transition for students from one institution to another.

Another obligation of the Procedural Committee is to recommend to the Leadership Committee (CEO's) funding at an adequate level for instructor salaries, materials, supplies and equipment.

The Procedural Committee with the assistance of the Curriculum Committee will develop a competency achievement document. This record will indicate the student's name and address, the school name and address for the institution offering the course, the articulated course name and number, a list of competencies to be achieved in the course, an evaluation of the degree of student achievement for each competency, and the instructor's verification signature. The competency achievement record will become part of the student's permanent file and included with grade transcripts requested by any postsecondary institution.

Another major responsibility of the Procedural Committee is the establishment of an Evaluation Committee. This committee will be responsible for conducting assessment of articulated programs. Members of the Evaluation Committee will consist of administrators and program personnel from the participating schools and possibly the State Department of Vocational-Technical Education. Evaluation Committee members will be responsible for establishing guidelines to verify that the secondary school students are achieving the competency requirements of the postsecondary school. This will help the postsecondary school maintain its standards and credibility. Additionally, an evaluation will assure that the secondary school students are receiving a level of instruction that will enable them to achieve success in subsequent postsecondary courses. The Evaluation Committee will report its findings to the Procedural Committee and recommend program changes when needed.

IV. PROBLEMS ENCOUNTERED

The major problem encountered is committing the staff from each institution to devote enough time to complete the project. Although timelines were established at the beginning of the program it has been very difficult to maintain them. Another problem has been a fear that programs may be established at great cost to the institutions, and students will not enroll. Funding for full implementation may be in jeopardy due to budget shortfalls at the state and local level.

V. PRELIMINARY PLAN

Courses that probably will be identified for articulation are indicated by an asterisk on the following suggested high school course of study. These courses are prerequisite to further study in high-tech.

9th Grade

1st Semester	2nd Semester
English	English
Algebra I	Algebra I
Elective	Elective
*Careers in High Tech	*Careers in High Tech
Biology	Biology
Typing	Oklahoma History

10th Grade

1st Semester	2nd Semester
English	English
World History	World History
Geometry	Geometry
Chemistry	Chemistry
*Computer Literacy	*Graphics
Elective	Elective

11th Grade

1st Semester	2nd Semester
English	English
*Algebra II	*Algebra II
*Physics I	*Physics I
*Fundamentals of Electricity/Electronics	*Fundamentals of Electricity/Electronics
U.S. History	U.S. History
Elective	Elective

12th Grade

1st Semester	2nd Semester
English	English
*Physics II	*Physics II
*Analog Devices	*Analog Devices
*Fluid Power	*Mechanical Devices
*Trigonometry	*Trigonometry
Elective	Elective

---

*Indicates High-Tech Courses

VI. BENEFITS

Although the project has not been completed, it is expected that the major benefits will be: (1) secondary students receiving articulated credit will be well prepared for, and will have no difficulty in successfully completing subsequent courses at the postsecondary level; (2) secondary students can be assured of entry into a postsecondary program for completion of a course of study; (3) beginning the program in high school will decrease the amount of time necessary for completion of a high-tech program at the postsecondary level; (4) resources of participating institutions will be better utilized by not duplicating facilities and equipment; and (5) industry will have a pool of well-trained technicians.

The presenter believes and hopes that successful completion of this project will lead to other ventures to develop articulated curricula between secondary and postsecondary institutions.

2+2 EDUCATION FOR TECHNOLOGY EMPLOYMENT:
A NEW ILLINOIS INITIATIVE

Dr. John Washburn, Manager
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Illinois Board of Education
Springfield, Illinois

Dr. John S. Washburn is Manager of the Research and Development Section, Department of Adult, Vocational and Technical Education, Illinois State Board of Education. Dr. Washburn holds B.S. and M.S. degrees in Technical and Industrial Education from SIU/C and an Ed.D. in Educational Administration from the University of Illinois. Currently, Dr. Washburn is President of the National Research Coordinating Unit Association, Chair of the V-TECS Board of Directors and study coordinator for a major Illinois policy study on education for employment.

PRESENTATION OUTLINE

I. Background and Purpose
II. Program Description
III. Developing a 2+2 Curriculum
IV. Current Status

I. BACKGROUND AND PURPOSE

The Illinois State Board of education has embarked on a new initiative to address the existing and future education and training needs of the Illinois' youth and adults. This new one million dollar initiative is called the "Education for Technology Employment" program. The program is designed to provide students, at the secondary and postsecondary levels, with the knowledge and skills which will contribute to their mastery of job functions in advanced technical occupations. Emphasis in the 1984-85 program of work is on "special" competency-based programs in computer-aided drafting/design/manufacturing, information processing, and electronics.

The Education for Technology Employment (ETE) program has as its major goal assuring that students completing high school will have the fundamental knowledge and skills (basic, technical, and attitudinal) to pursue postsecondary technical training in highly advanced areas. Eight secondary school sites have been selected to participate in this new initiative. The sites have established cooperative relationships with their local community college(s) and other high schools in the surrounding area. Emphasis is placed on cooperative high school, area vocational center and community college programming which is based on student, community, and labor market information.

II. PROGRAM DESCRIPTION

The ETE initiative, supported by the State Board of Education, is designed to address the challenge of changing technology and its effect on the states' vocational education program. The State Board of Education recognized that technological change--transforming the work place in dramatic ways--is continuing to influence the nature of education, training and work.

ETE project staff have identified four major functional areas of vocational education which define the context for various secondary/postsecondary articulation activities:

1. Curriculum and instruction (including curriculum design as well as teaching personnel, equipment, facilities and materials);
2. Student services (including student record systems, guidance, counseling, placement, and follow-up, as well as services for special populations);

3. Program management (including administrative structures/operations); and
4. Community resources (including involvement of community representatives and utilization of employers, advisory committees and other education and service agencies).

The ETE staff are working on 2+2 (11-14 grade) programs in electronics, information processing, home economics, computer-assisted manufacturing, health occupations, agricultural occupations, and finally, in computer-aided drafting.

For the purpose of this paper the computer-aided drafting program is being highlighted as an example of cooperative 2+2 (secondary/postsecondary) articulation--between high schools, area vocational centers and community colleges. The computer-aided drafting program, as a 2+2 initiative, is the first curriculum and instructional product that has been developed. Initial implementation for this new CAD program has taken place in the fall of 1984.

III. DEVELOPING A 2+2 CURRICULUM

The following steps were taken in the development of the 2+2 computer-aided drafting curriculum:

1. Eight secondary-level teachers, two community college teachers, one university-level teacher educator, and one state education agency consultant met to analyze computer-aided drafting tasks that could be used as the framework for an articulated 11-14 grade computer-aided drafting program.
2. The same group met in two subsequent meetings to continue work in defining the computer-aided drafting task list.
3. Each of the schools involved in the ETE program asked their industrial advisory committees to validate the initial CAD task list.
4. Sixteen teachers from the eight ETE sites were selected to be trained on CAD systems. They were also trained to write competency-based curriculum. These teachers attended a two-day competency-based curriculum writing workshop designed to teach competency-based instructional skills.
5. The Harper Community College CAD/CAM center was chosen as the training/curriculum development site for these sixteen teachers. A planning committee consisting of representatives from state and local education agencies met and designed a three-week session (for curriculum purposes) to be held at the CAD/CAM center.

6. Sixteen teachers were trained on various micro systems, i.e., CAD APPLE, CADRIC, MATCCAD, ROBOGRAPHICS, MICRO MINNDRAFT, MIN DRAFT as well as the Apple Con and Computer Vision industrial systems. The sixteen teachers were divided into two groups of eight. The two groups exchanged time with one group training on Micro CAD systems, and another group working on curriculum. Each teacher participating in the curriculum writing workshop received college credit from Northern Illinois University.

7. Finally, the sixteen teachers were provided with capstone experiences in industry at the Electromotive Division of General Motors Corporation. The teachers were allowed to work at the Auto Trol CAD stations and were instructed by Electromotive employees.

IV. CURRENT STATUS

As of November, 1984, each of the eight secondary sites and their corresponding community colleges have available a 2+2 curriculum ready for field testing. The sixteen teachers will be used to work with other Illinois teachers in developing similar 2+2 programs in their respective schools. During this field testing phase special basic and attitudinal skills will be added to the curriculum.

Illinois has just begun the initial process of concentrating on articulation of secondary/postsecondary programs. The State Superintendent of Education has recommended a new policy and administrative plan for Illinois' education for employment program. One part of this administrative plan (during the second year of implementation) emphasizes the need for developing formal articulation agreements between high schools and area vocational centers and their respective community college(s). These agreements will emphasize: (a) transition of the student from one educational level to the next without unnecessary delay or duplication of effort; (b) cooperation in joint use of facilities, equipment and staff; and (c) cooperative efforts in continuous planning, evaluation and improvement of programs.

The Illinois State Superintendent of Education has recommended the funding for the Education for Technology Employment initiative be increased to $1.5 million dollars for 1985-86. Increased funding for 1985-86 will be used to support additional 2+2 program development. The State Board of Education is committed to providing students at the secondary and postsecondary level with an articulated program that concentrates on the application of basic, technical and attitudinal skills necessary for an entry into highly technical occupations.

ARTICULATION OF HEALTH OCCUPATIONS EDUCATION AT T.H. PICKENS TECHNICAL CENTER/AURORA PUBLIC SCHOOLS AND ARAPAHOE COMMUNITY COLLEGE

LeAnna Skogen
Aurora, Colorado

LeAnna Skogen is a Registered Nurse who has worked in vocational education at the T.H. Pickens Technical Center in Aurora, Colorado, since 1972. She has an M.A. degree in Curriculum and Instruction (vocational emphasis) from the University of Northern Colorado. She taught high school nurse aide students for two years, then developed and taught an aide-level health cluster program. She was appointed Health Occupations Supervisor in 1976 when several postsecondary programs were initiated at the Center. Mrs. Skogen's current responsibilities include supervision of Practical Nursing, Dental Assisting, Medical Assisting, Medical Laboratory Technician, Respiratory Therapy Technician, Opticianry, Ward Secretary, EKG Technician, Nurse Refresher, Health Aide Cluster programs and several continuing education courses.

Mrs. Skogen has been active in the Health Occupations Division of Colorado Vocational Association, serving as treasurer for five years. She was on the State Advisory Committee for Colorado Health Occupations Students of America for three years during the developmental stages. She also served on the Voc-Ed Editorial and Publications Committee from 1979 to 1982.

PRESENTATION OUTLINE

I. Background and Need

II. Planning for Articulation

III. Articulation Agreement

IV. Implementing the Program

V. Current Status

TWO APPROACHES TO ARTICULATION
IN
HEALTH OCCUPATIONS EDUCATION

I will briefly describe two working agreements which represent different approaches to articulation between an area vocational school and community college associate degree programs. The first agreement which I'll describe can be called "course specific", and involves the transfer of a specific number of credits for completion of specific comparable courses. This approach led to an agreement which facilitates completion of an AAS Degree by graduates of a Medical Laboratory Technician-Certificate program. Credit is not given for all courses taken, but only those which were comparable in content.

The second approach to articulation is sometimes called the "block method", in which all credit earned in a certificate program is transferable toward an Associate Degree. In this type of agreement there are no comparable courses at the community college, but the content of courses taken at the vocational school is built upon.

In order to understand why the Health Occupations Department at Pickens Technical Center (PTC) sought an articulation agreement with Arapahoe Community College (ACC) you need to understand the importance of National Certification of health care workers. Employers are assured that health workers who have passed examinations administered by their national professional organization have obtained a certain level of compentency in the field. These professional organizations are generally under the umbrella of the American Medical Association or American Dental Association.

The incentive for Pickens Technical Center to seek articulation with Arapahoe Community College came in 1980, when the Medical Laboratory Technician-Certificate program was notified that the National Certification exam would be discontinued for graduates of 1 year schools after August, 1982. Since employers in the Denver Metro area are reluctant to hire non-certified MLT's, it was apparent that we would need to consider discontinuing the program; or find a way to offer graduates the opportunity to obtain an Associate Degree, thereby qualifying them to take the 2 year level examination.

Since Arapahoe Community College already had an Associate Degree MLT program in place, a meeting was requested between the Technical Center and Community College administration and faculty. It was agreed that an articulation agreement would be beneficial for both schools, and their students. The rationale for working toward articulation included:

a. Enabling graduates of PTC to meet the requirements for national certification after one additional year of school.
b. Other benefits to students such as less transportation costs for Aurora residents the first year, and the ability to work in the field while attending community college part-time.
c. Increasing student FTE at ACC for 2nd year MLT students. High attrition had routinely resulted in a less than full complement of students in the program.
d. Enabling the Technical Center to continue a program, making full use of a program specific laboratory which was filled with expensive equipment and supplies.

A second meeting included representatives from the State Board for Occupational Education and resulted in verbal approval for work to begin. The instructors met several times to compare curriculum. Content of each course was compared for depth and breadth.

The original intent was to develop a 1 + 1 type agreement which would allow graduates from the Technical Center Certificate program to transfer all credits earned into the second year of the Community College program. A "snag" in the negotiations occurred with the Community College Science Department. Their instructors were not available for negotiations; actually were not interested in looking at the possibility of transfering credit for the Anatomy and Physiology course taken at PTC.

After several frustrating months, the Technical Center proposed working on transfer credit for specific MLT courses only. This was a possibility because one of the options for eligibility to take the MLT (ASCP) Certificate exam is "completion of 30 semester hours of academic credit (including 6 chemistry and 6 biology) and successful completion of CAHEA accredited MLT-C program." Therefore, our students did not need to fit into the exact curriculum which had been developed at ACC. Actually, under this rule, several of our graduates who had attended college prior to enrolling in the MLT-C program had qualified to take the MLT-D examination immediately upon completion. Therefore, we decided to proceed by working for transfer credit of MLT specific courses only.

The program instructors were the key to "nitty-gritty" negotiations, since they were familiar with the details of course content. They met several times, carefully comparing the content in each MLT course. They decided that the only MLT related areas which were lacking in depth at the certificate level were in parasitology and mycology. Although Technical Center students do not receive quite as many clinical experience hours, the hours are sufficient to meet the eligibility requirements for National Certification, so the agreement does not require clinical experience during the second year.

An informal agreement was then drawn up, based on the instructor recommendations. It is reviewed yearly, and adjusted if either school has made curriculum changes in the transfer courses. (A copy of the agreement is attached on page 6.)

Recruitment of students has been enhanced by publicity of the articulation agreement. Aurora students can attend their first year close to home, with the knowledge of exactly what courses will need to be taken at Arapahoe Community College to complete their degree. If they plan ahead, they can take some of the science courses (especially Anatomy and Physiology) at Arapahoe Community College before entering the MLT-C program, eliminating the need to repeat the content. The community college has benefited with increased enrollment in the second level courses.

Six students have taken advantage of the transfer agreement since it was signed in March, 1982. All of them were successful in passing the National Certification Examination for Medical Laboratory Technician (ASCP). Their employment opportunities have been greatly enhanced as a result of the cooperation between the two schools.

Block type articulation was achieved in 1984 for graduates of the Optical Fabrication and Dispensing program. This certificate program graduates Opticians who can make spectacles, and dispense them in a store or eye doctor's office. The job market is excellent, and students often have jobs before they complete the program. Therefore, there was no need for transfer of specific course credits into an existing program in order for the student to become more employable.

The optical community did identify a need for a broader base of knowledge for people to progress beyond the technician level, especially in management of optical businesses. The advisory committee and former students felt that knowledge of business processes and better communication skills would be helpful.

At about the time these ideas were being developed, the Colorado Legislature was debating the need for a community college in Aurora, to serve a rapidly expanding population in one of the fastest growing cities in the nation. In April, 1983 the law designating a state system community college in Aurora was passed. It created a "college without walls" which houses reference materials in the City library, and has classroom space in several locations. The law also mandated that the college, the Aurora Public Schools, and the City of Aurora work together to avoid duplication of educational efforts and to maximize educational benefits for Aurora residents.

A program review was conducted at the Technical Center for the purpose of recommending programs which would benefit from articulation with the new college. The optical program was among those designated for upgrading to Associate Degree status.

Technical Center staff did a survey of graduates and students to verify their interest in pursuing an associate degree. The program advisory committee and members of the Colorado Society of Dispensing Opticians worked with the Dean of Instruction at Aurora Community College to identify the courses which would be most useful to opticians. Since the certificate program at the Technical Center is very concentrated, 56 semester credit hours are earned in the first year. Courses selected for study at the Community College included business management electives, Principles of Marketing, and Human Relations in Business and Industry. General studies courses which are required of all community college students complete the 25 semester credit hours of study at CCA for an Associate of Applied ScienceDegree in Opticianry Technology. (A course listing is attached on page 8.)

The program was approved by the Colorado State Board for Community Colleges and Occupational Education to begin implementation in September of this year. Both schools are publicizing it in catalogs and brochures and we are confident that it will be an effective addition to the program offerings.

In addition to these articulation agreements, I have been involved since January, 1984 in a Colorado State Board initiated articulation process for Dental Auxiliary and Nursing Programs. The process we are using is different from either of those I just discussed, and the recommendations which appear to be surfacing will include the use of "bridging" courses and the use of equivalency examinations or specification of competencies. We can discuss these concepts further during the small group sessions if you are interested.

CONTRACTUAL AGREEMENT BETWEEN
T.H. PICKENS TECHNICAL CENTER/AURORA PUBLIC SCHOOLS
AND
ARAPAHOE COMMUNITY COLLEGE

This agreement is entered into by Arapahoe Community College (ACC) and the T.H. Pickens Technical Center/Aurora Public Schools for the purpose of fostering a successful articulation between the two institutions in the awarding of an Associate in Applied Science Degree by ACC to graduates of the Pickens Technical Center Medical Laboratory Technician-Certificate program who have completed the stipulated course requirements.

The general objectives of this agreement are to establish the transfer credit which will be awarded by Arapahoe Community College for the Technical Center. It stipulates the additional course requirements necessary to secure the Associate Degree in Applied Science through ACC. It also identifies credit that Pickens Technical Center would accept from ACC in the event of such a student request. Additionally, this agreement sets forth the individual and mutual responsibilities of both parties involved in accomplishing these goals.

Arapahoe Community College and the T.H. Pickens Technical Center hereby mutually agree to the following course credit transfers provided a minimum grade of C has been achieved in each course.

PTC COURSE		ACC CREDIT (Semester Hours)
HOE 100 Life Sc. I	----------------------	0
HOE 175 IPR	----------------------	0
HOE 130 Math MLT 102 Orientation MLT 142 Urinalysis MLT 172 Serology	MOT 101 Materials, Equipment and Urinalyisis, Serology	5
MLT 112 Hematology MLT 117 Coagulation	MLT 103 Blood Collection and Hematology	5
MLT 152 Chemistry	MLT 203 Clinical Chemistry	5
MLT 162 Blood Bank	MLT 102 Blood Banking	3
MLT 180 Microbiology	MOT 202 Clinical Bacteriology	4
MLT 185 Parasitology	----------------------	0
Clinical Coop (980 hrs.)	MLT 211 & 212 Practicum I & II	18

TOTAL 40

The following list stipulates those courses which must be completed by the student at Arapahoe Community College in addition to the transfer credits established above to ensure eligibility for the Associate Degree in Applied Science to be awarded by ACC. Note: The current list reflects changes resulting from ACC's conversion to semester system (Fall, 1982).

ACC COURSE	ACC CREDIT (Semester Hours)
MLT 201 Medical Parasitology	2
MLT 205 Mycology	8
CHE 101 and 102 Introductory Chemistry	8
BIO 201 and 202 Anatomy and Physiology	8
ENG 121 Composition	3
General Education Elective	3
Social Science or Humanities Elective	3
SPE Interpersonal Communication	3
TOTAL	32

PER 101 plus one PER activity course are required on all ACC degrees. PER 101 and one PER activity course can be used to partially fulfill the general education requirements for this degree. The PER requirement will be waived for all students over 35 years of age.

Mutual cooperation and coordination in the transition of activities between the two institutions is the responsibility of both parties involved. A program advisor will be assigned to the student at each of the individual facilities to aid in this coordination.

The agreement is to be reviewed annually by both parties for any changes necessary. Termination of this agreement or any amendments are to be made thirty (30) days previous to the effective date, in writing.

This agreement shall be effective on the _____day of ____________, 19____.

Arapahoe Community College Administrator	T.H. Pickens Technical Center Aurora Public Schools Administrator
______________________________	______________________________
______________________________	______________________________
Title	Title

BEST COPY AVAILABLE

FORM VE 137/VOCATIONAL EDUCATION POST SECONDARY COURSE INFORMATION
By Approved VE 120 Program
(Use Separate Sheet for Each Program—See Instructions Reverse Side)

SCHOOL: COMMUNITY COLLEGE OF AURORA
2. DATE: 3-14-84
LOCATION: AURORA
4. SCHOOL YEAR: 1984-85
PROGRAM NAME: OPTICIANRY TECHNOLOGY
U.S.O.E. PROGRAM NO.: 17.0702

	7. CATALOG COURSE NUMBER	8. COURSE NAME	9. COURSE CLOCK HOURS				10. COURSE CREDIT HOURS	11. COURSE RELATED COMMENTS (See Instructions)
		OPTICAL FABRICATION AND DISPENSING	Theory Class	Lab Shop	Clinic COOP	Total		
	OPT 120	Optical Laboratory Procedures I	78	354		432	21	
	OPT 122	Light, Lenses and Eyes	84	3		87	6	
	OPT 130	Optical Laboratory Procedures						
		Procedures II	79	10		89	6	
	OPT 150	Dispensing	151	74		225	13	
	OPT 200	Optical Clinical Experience	54		288	342	10	
		Subtotal	446	441	288	1175	56	
	COURSES	TAUGHT AT COMMUNITY COLLEGE OF AURORA						
	ENG 111	English Composition I	45			45	3	NVR
	SPE 211	Introduction to Speech	45			45	3	NVR
	HUM 111	Studies in the Humanities I	45			45	3	NVR
	MAN	Management Elective	45			45	3	
	MAR 107	Principles of Marketing	45			45	3	
	MAT 114	Mathematics for College Students	45			45	3	NVR
	PHY 101	Fundamentals of Physics or	90			90	4	NVR
	BIO 111	Human Anatomy and Physiology						
	PSY 117	Human Relations in Business and						
		Industry	45			45	3	NVR
		Subtotal	405			405	25	
		TOTAL	1580			1580	81	

Mary J. Davis
DATE 3-29-84
DATE

References

Boettner, Marianne. Articulation Position Paper: Colorado Dental Auxiliary and Nursing Programs. Denver: State Board for Community Colleges and Occupational Education, 1984.

Gillespie, Wilma & Redford, Jeanette. Health Occupations Education: A Review of the Literature. Columbus, Ohio: The National Center for Research in Vocational Education, 1980. pp. 124-132.

Glau, Jon E. Secondary/Post-secondary Articulation of Vocational Education. Denver: State Board for Community Colleges and Occupational Education, 1984.

Morgan, Dr. Frederic and Robertson, Ramon. Articulation: A Cooperative Venture. Illinois State Board of Education, 1982.

National Commission of Allied Health Education. The Future of Allied Health Education. San Francisco: Jossey-Bass, 1980.

National Commission On Nursing. Summary of Public Hearings. Chicaco: The Hospital Research and Educational Trust, 1981. pp. 15-24.

Story, Donna K. Career Mobility: Implementing the Ladder Concept in Associate Degree and Practical Nursing Curricula. St. Louis: C.V. Mosby Co., 1974.

ARTICULATION OF ELECTRONICS AND TELECOMMUNICATIONS PROGRAMS AT PENINSULA PUBLIC SECONDARY SCHOOLS, THE PENINSULA VOCATIONAL-TECHNICAL CENTER (NEW HORIZONS), AND THOMAS NELSON COMMUNITY COLLEGE

Paul L. Cummings
Newport News, Virginia

Mr. Paul Cummings received his undergraduate degree and Masters degree from Virginia Tech, and has done graduate work at Old Dominion University. He has ten years teaching experience in Prince William County, Virginia, and eight years in central office supervision. He has been an Adjunct Professor for Virginia Tech and Old Dominion. Mr. Cummings currently serves as Supervisor of Industrial Arts and Industrial Education for the Newport News Public Schools. He has received awards as teacher of the year in industrial arts, and as national industrial arts supervisor of the year.

PRESENTATION OUTLINE

I. Background and Need for the Program

II. Problem and Objective

III. Implementation Procedures and Progress

IV. The Challenge to Virginia

V. Related Materials

ABSTRACT:

A SECONDARY/POSTSECONDARY PROGRAM TO PREPARE TECHNICIANS

The proposed secondary/postsecondary program is a four-year vocational-technical curriculum designed to prepare technicians for new, advanced-technology occupations such as electronics and telecommunications technicians. This program consists of two years of instruction at the secondary or high school level and two years of preparation at the postsecondary or community college level. Although this type of curriculum plan has been called a "two-plus-two program," the emphasis here is on a comprehensive, coordinated curriculum that spans two levels of instruction. The program represents a skillful blending of resources for vocational-technical and general education at these two levels to develop the advanced, complex competencies required for new-technology occupations or "high technology." These occupations are referred to as "new technology" rather than as "high technology" because the newness approach encompasses all the additional changes that are likely to occur in the rapidly changing technological world.

I. Background and Need for the Program

The new technology is characterized by indepth involvement with computers, with complex systems, and with swiftly changing technical content. The term "super tech" has been used to describe the type of technician required for the new technology:

> . . . the greatest need is for the 'super tech' who can install, operate, maintain, and repair systems that may incorporate combinations of electrical motors, digital circuits, mechanisms, hydraulic actuators, lenses, light sources, and transducers.[1]

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[1] Daniel M. Hull, "What Is High Technology?" Presentation at the Vocational Association/Center for Occupational Research and Development Regional Workshop, Harper's Ferry, West Virginia, May 3-4, 1983, p. 4.

Although the committee responsible for development of the proposal feels that the "product" of the preparation program is a master technician rather than a "super" one, the need for special, advanced, and comprehensive competencies is clearly recognized. Performance of new-technology skills requires workers who have a broad base of technical knowledge, who are able to apply basic processes, and who are flexible rather than narrowly specialized. An interdisciplinary approach to technician training is needed, as well as a competency-based (CBE) component. Business, industry, and government are looking to vocational-technical education, working with other appropriate disciplines such as mathematics and science, to provide the curriculum structure that will result in the master-tech product. Vocational-technical education, in turn, is looking to the secondary/postsecondary program and to cooperative efforts with practitioners of the new technology.

Technical preparation at the secondary level is expected to develop basic required competencies for the new technology in mathematics, science, and communications and to train students to apply these basic disciplines to tools, materials, processes, controls, and energy-conversion systems.

Students should be able to progress smoothly and efficiently from pre-engineering technology at the high school level to a specific, yet flexible, job-ready, advanced-skill level of performance in engineering technology at the community college. Pedrotti recommends a postsecondary curriculum composed of two primary parts: a common core and a specialty sequence. The common core contains basic skills (advanced mathematics, the physical sciences, human relations and sociology, technical communications, and computer literacy) and a technical core (for example, electrical and electronic devices, fluid devices, optical devices, and microcomputers). The speciality sequence consists of five or six courses designed for specialization in a specific technology. The common core remains the same for all specialty areas.[2] A modified version of this approach is recommended for the proposed pilot program.

There is a national as well as a statewide need for skilled new-technology workers. Virginia has an opportunity to try out the secondary/postsecondary program as the recommended method of preparing technicians for new-technology occupations—quickly, economically, and competently. If the program is effective as anticipated, it could serve as a model for similar programs and stimulate expansion of new-technology training. Virginia could become a central resource area for skilled technicians, thereby attracting new industries that require master technicians.

II. Problem and Objective

The basic problem inherent in establishing a model secondary/postsecondary program for the preparation of technicians may be stated as follows:

> Is the secondary/postsecondary program a feasible, effective, efficient method of preparing technicians in Virginia for new-technology occupations?

Sixteen questions considered as subparts of the above major problem are identified in the proposal. These questions indicate the quantity and complexity of the issues to be addressed in establishing a new-technology program. Among the many factors to consider in program development the following three are emphasized in the proposal as critical for successful implementation: coordination of secondary and postsecondary preparation; selection of students for the program; and the need for a logical, orderly implementation plan.

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[2] Dr. Leno S. Pedrotti, "Redesigning Vocational Curricula—Postsecondary Curriculum Design Guidelines," Presentation at the American Vocational Association/Center for Occupational Research and Development Regional Workshop, Harper's Ferry, West Virginia, May 3-4, 1983, pp. 41-42.

The objective of the proposed project is as follows:

> To establish a model new-technology program in the Peninsula area that is designed to prepare technicians in electronics/electromechanical technology.

The Proposal Review and Development Committee recommends that new-technology training in Virginia focus first on electronics/electromechanical technology with a plan to create "spin-off" programs later if the model program is judged to be effective. Examples of "spin-off" program that could be developed in other areas of the state, as well as on the Peninsula, are information-processing technology, systems analysis technology, and environmental technology.

Participants in the proposed project would be Peninsula public secondary schools, the Peninsula Vocational-Technical Center (New Horizons), and Thomas Nelson Community College. Initial implementation procedures would center on planning and detailed program and curriculum development.

III. Implementation Procedures and Progress

The following phases of project implementation have been identified: (1) planning, (2) development, (3) establishment of the pilot program, (4) evaluation and refinement, and (5) dissemination. Business, industry, and government associated with the new technology are to be actively involved during the five developmental phases. Their participation throughout the project has been referred to as the "BIG" approach to implementation.

Progress to date in implementing the project may be summarized as follows:

- The Proposal Development and Review Committee (representing secondary and postsecondary education, general and vocational education, and state and local educational and industrial resources) served as the steering committee of the project during the early planning stage, accomplishing the following:
    - Organized meetings and appointed a Curriculum Framework Subcommittee;
    - Collected and prepared materials concerning program concepts, including printed and visual information; and
    - Appointed a local task force to move the next organizational phase of the project toward Peninsula-based administration.

- The Curriculum Framework Subcommittee took the following action toward construction of a curriculum design for the program:
    - Prepared the agreement, signed by Peninsula area education officials, that will serve as the written commitment to cooperate in program and curriculum development;
    - Collected and prepared materials concerning curriculum concepts, including printed and visual information;
    - Divided into two subgroups, Secondary Curriculum and Postsecondary Curriculum, and described generally the content and structure of the curriculum at these two instructional levels, including identification of the type of student to be served by the program;
    - Submitted a tentative identification of phases of curriculum development and next steps toward implementation of program and curriculum concepts;
    - Prepared a chart indicating the subcommittee's recommendation for organization of the project in the Peninsula area, including collaboration with business, industry, and government throughout the project; and
    - Worked with the Virginia Peninsula Vocational Training Council in conducting preliminary occupational research concerning the field of electronics technology in the Peninsula area.

(Courses currently granted articulated credit are: Word Processing, Office Technology II, Basic Technical Drafting, Engineering Drafting, Architectural Drafting, and Metal Machining.)

IV. The Challenge to Virginia

Virginia is faced with a challenge--to provide for and to benefit from the new technology. In addition, vocational-technical education in the state and nation is facing an enormous challenge to respond immediately and effectively to the seemingly sudden demands of a new-technology society.

The proposed pilot program can build on existing state assets--vocational-technical education systems, faculty, and administrators at secondary and postsecondary levels; in-place articulation agreements; the competency-based (CBE) delivery system; interdisciplinary cooperative efforts already underway in public education; identified learning objectives for both general and vocational education; and potential sites for the demonstration program.

V. RELATED MATERIALS

A. Virginia Peninsula Model for Articulation
B. Articulation Agreement
C. Example Task/Competency and Record of Achievement
D. Sample Communication Structure to Facilitate Articulation Efforts
E. Coordinated Student Services for Students in Articulated Programs
F. Curriculum Coordination Procedure

A.

The Virginia Peninsula Model for Articulation of Secondary and Postsecondary Vocational Education Programs

March 15, 1979–June 30, 1982

The project is directed toward the development of a coordinated articulated competency-based curriculum which includes a set of tasks and performance objectives, a set of criterion-referenced measures, and a set of instructional resource guides (IRGs) in the occupational areas of Clerk Typist and Related Occupations, Mechanical Drafting, and Machine Shop.

Goals and Objectives

I. To develop and implement an articulation model for the participating institutions as evidenced by:

   A. Execution of written agreements by the chief administrators and appropriate faculty of the participating institutions.

   B. Establishment of an executive committee with the appropriate representation of participating institutions.

   C. Establishment of an articulation advisory committee (AAC) representative of faculty, administration, guidance, supervision, and vocational education advisory council members of participating institutions.

   D. Establishment of a curriculum development committee (CDC) for each of the three program areas, consisting of teachers of each respective program area from the participating institutions.

   E. Establishment of a Craft Advisory Committee for each of the three CDCs, consisting of members of business/industry for each respective program area.

   F. Development of a Computerized Student Profile to be used in the horizontal and vertical matriculation of students among the participating institutions.

   G. Development of a communications network among the institutions, the community, and the students.

   H. Implementation of an inservice staff development program for participating faculty, administration, guidance, supervision, and vocational education advisory council members of each of the participating institutions.

   I. Provision for policy development and other activities which are deemed appropriate and necessary for the successful promotion and implementation of the articulation model.

II. To evaluate the effectiveness of the articulation model.

Project Design

Three occupational areas have been identified as being the most amenable to articulation at this time. These occupational areas are: Clerk Typist and Related Occupations, Mechanical Drafting, and Machine Shop.

In order to implement this project it was necessary to accomplish the following:

1. Obtain written articulation agreements from the chief administrative officer of each of the participating institutions; addressing such areas as eligible student population, provisions for faculty involvement, transfer agreements, and dissemination of information about the articulated programs.
2. Appoint a director and co-director from the participating institutions to oversee the project and to aid in the establishment of an executive committee.
3. Establish an executive committee consisting of an administrator from each of the participating institutions and the superintendent in charge of The Virginia Peninsula Vocational-Technical Education Center (Vo-Tech), whose responsibilities are to establish policies and procedures for the effective operation of the articulation model; using the services of Dr. James Hoerner, Division of Vocational and Technical Education, Virginia Polytechnic and State University, and Dr. Ralph Horne, Director of the Coordination Project.
4. Establish an articulation advisory committee (AAC) representative of faculty, administration, guidance, superivision, and vocational education advisory council members of the participating institutions, whose responsibilities are to assist in providing the public with information concerning the project, provide input from the constituencies that it represents, and periodically evaluate the progress of the articulation model; making recommendations for its improvement.
5. Establish a curriculum development committee (CDC) for each of the three program areas: Clerk Typist and Related Occupations, Mechanical Drafting, and Machine Shop, consisting of teachers of each respective program area from participating institutions. The primary responsibility of these committees is the completion of the instructional resource guides (IRGs).
6. Establish a Craft Advisory Committe for each of the CDCs consisting of members from business/industry for their respective program areas. The primary purpose of these committees is to validate the task/competencies to assure the role-relevance of the program area's IRG.
7. Establish a communications network among the articulating institutions, the community, and students.
8. Hold an orientation workshop for all involved personnel in each of the program areas to address the major advantages

of articulation--i.e., efficient use of personnel, facilities, and more efficient use of student's time and the major barriers of articulation--i.e., turf protection, lack of trust and mutual respect, and the insufficient documentation of student competencies.

9. Develop a core of task/competencies and criterion-referenced measures which will be the structure upon which the IRG for each program area will be built.
10. Coordinate the Machine Shop IRG with both Southwest Virginia Community College (SVCC) and Central Virginia Community College (CVCC); the Mechanical Drafting IRG with CVCC; and the Clerk Typist IRG with SVCC.
11. Establish a documentation procedure by which students can move both horizontally and vertically through their respective program areas.
12. Develop evaluation instruments for the formative and summative evaluation of the materials developed by the project.
13. Establish a Computerized Student Profile.
14. Assist in the development of audiovisual presentations on CBE/articulation.
15. Field test the completed IRGs in the three program areas.

Target Population

The target population for this project includes the senior high school students who are enrolled in the occupational areas of Clerk Typist and Related Occupations, Mechanical Drafting, and Machine Shop. The faculty, guidance, and administrators of the participating institutions who are responsibile for the above mentioned program areas will also be directly involved in the project.

SCHOOLS	NUMBER OF STUDENTS INVOLVED
Hampton City Schools	1500
Newport News City Schools	2400
Poquoson City Schools	136
Williamsburg-James City County Public Schools	164
York County Public Schools	300
Peninsula Vo-Tech	100
Thomas Nelson Community College	500
	5090

Procedures Followed

The commitment to bring about a coordinated articulated competency-based curriculum on the Peninsula began when a group from the Peninsula attended a conference on articulation at Virginia Polytechnic and State University (Virginia Tech) in October, 1978. It was decided to apply for the grant when it was received from the State Department of Education.

Upon receipt of the request for proposal (RFP), a consortium was formed consisting of a representative from each of the local education agencies (LEAs) and Thomas Nelson Community College (TNCC). Those representatives were:

Elvin Adams, Director of Vocational Education, York County Public Schools
Jean Epps, Director of Vocational Education, Newport News City Schools
Fletcher Gray, Assistant Superintendent, Poquoson City Schools
Joseph Peone, Dean of Instruction, TNCC
Cecil Phillips, Coordinator of Cooperative Education, TNCC
William Sharpe, Secondary School Supervisor, Williamsburg-James City County Schools
Robert Suber, Director of Vocational Education, Hampton City Schools.

The consortium selected Cecil G. Phillips Jr., as Project Director and Jean M. Epps as Project Co-Director.

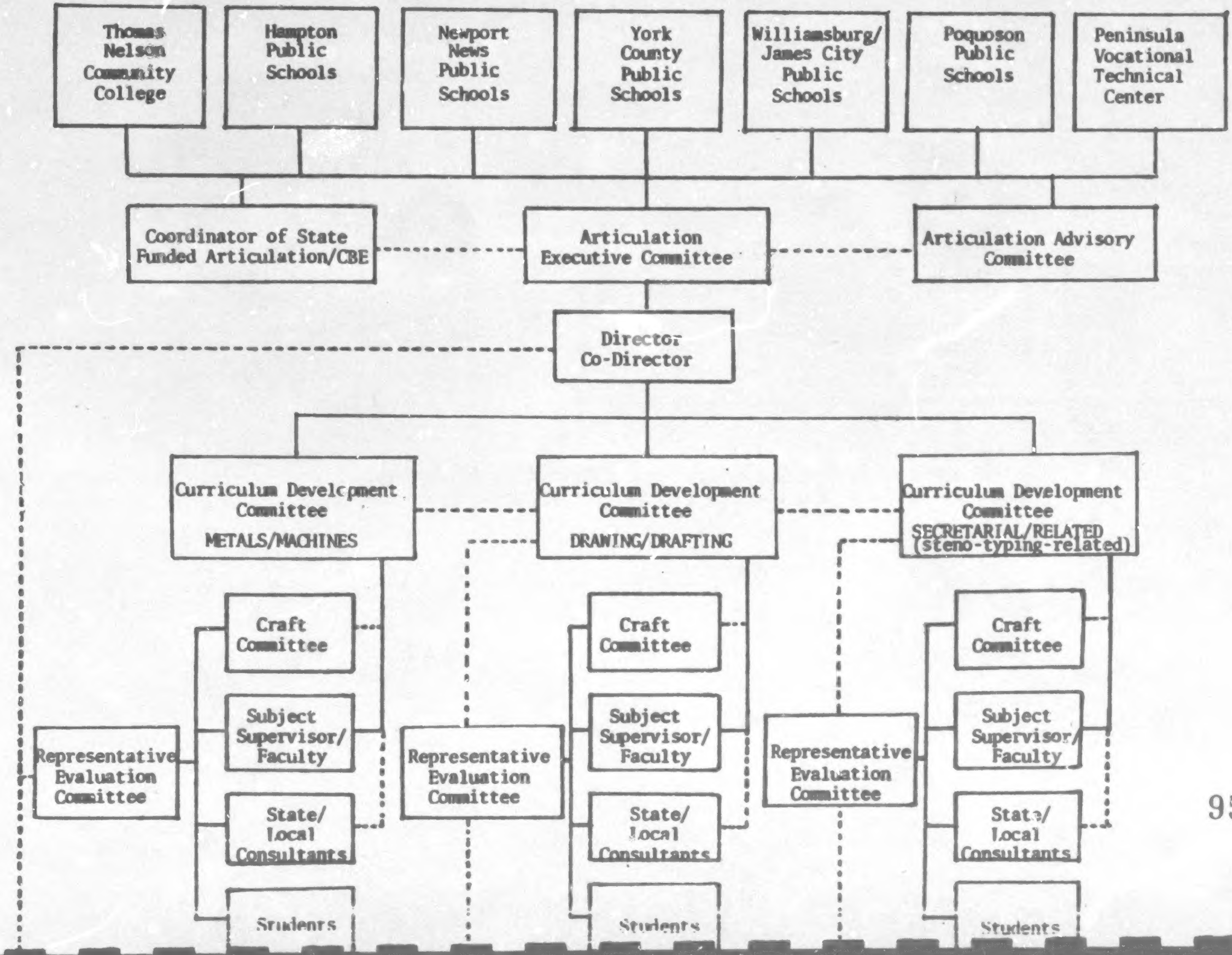
After receipt of the grant, the consortium met and reorganized into the Executive Committee. The following meetings were held to develop policy/procedures for the effective operation of the articulation model:

April 26 and 27, 1979 - Articulation Workshop - held with Dr. James Hoerner. This was the Executive Committee's organizational meeting. Dr. O. E. Ware was elected chairman of the committee with William Sharpe serving as his co-chairman. An organizational chart was adopted and the preliminary agenda for Phase I Orientation was set. (See Appendix A for full details of this meeting).

May 30, 1979 - Phase I Orientation Meeting. The Executive Committee met prior to Phase I Orientation to hear the sub-committee reports, accept the proposal of membership, structure, and duties/responsibilities of the CDCs, adopt the bylaws of the Executive Committee, and to discuss the purpose of the AAC. (See Appendix B for minutes and materials of this meeting).

August 8, 1979. The purpose of this meeting was to adopt the bylaws of the AAC and to discuss the plans for the organizational meeting of that committee. In addition, the committee approved the CBE course to be conducted by Old Dominion University for all faculty and administrators who had not previously had a CBE course and approved the written agreement between the LEAs, TNCC, and Peninsula Vo-Tech. (See Appendix C for minutes and materials of this meeting).

September 7, 1979. On this date the Executive Committee met to finalize plans for Phase II Orientation. (See Appendix D for minutes of this meeting).


Thomas Nelson Community College
Hampton Public Schools
Newport News Public Schools
York County Public Schools
Williamsburg/James City Public Schools
Poquoson Public Schools
Peninsula Vocational Technical Center
Coordinator of State Funded Articulation/CBE
Articulation Executive Committee
Articulation Advisory Committee
Director Co-Director
Curriculum Development Committee METALS/MACHINES
Curriculum Development Committee DRAWING/DRAFTING
Curriculum Development Committee SECRETARIAL/RELATED (steno-typing-related)
Craft Committee
Subject Supervisor/Faculty
State/Local Consultants
Students
Representative Evaluation Committee
Craft Committee
Subject Supervisor/Faculty
State/Local Consultants
Students
Representative Evaluation Committee
Craft Committee
Subject Supervisor/Faculty
State/Local Consultants
Students
Representative Evaluation Committee

ATTCH. 9

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Appendix A-24

ATTCH. 10

Appendix A-25

ORGANIZATION of EXECUTIVE COMMITTEE Phillips-Sharpe-Adams	Operational Procedures Purpose Function Membership	
ORGANIZATION of ARTICULATION ADVISORY COMMITTEE		
PLANNING of ORIENTATION Renz-Ware-Suber	Dates Places Content Agenda Speakers	Guests Schedule of Activities Participants Administrative Orientation
DEVELOPMENT of WRITTEN AGREEMENT		
CURRICULUM DEVELOPMENT Epps-Gray-Peone	Who When Structure Leave Time	Format Documentation Procedures Validation Craft Committees Evaluation Committees
STAFF DEVELOPMENT		
DEVELOPMENT of EVALUATION PLAN		
DEVELOPMENT of COMMUNICATION NETWORK		

B. ARTICULATION AGREEMENT

This agreement is made between Thomas Nelson Community College and Hampton City School Division.

We hereby agree to the following:

1. Participating instructors at the secondary and post-secondary level will formally adopt and teach from a list of competencies (task list) based on job-entry level task requirements. Criteria for evaluation and recording levels of competency will also be formally adopted.

2. Prior to the beginning of each academic year, a meeting will be scheduled to review each occupational area and amend, as necessary, the occupational task lists, grading systems, recording forms, and objective reference tests or criterion-referenced measures to establish levels of competency. The directors of vocational education of each participating school division and the Virginia Peninsula Vocational-Technical Education Center, the appropriate division chairman at Thomas Nelson Community College, program heads, supervisors, and teacher representatives (as required) will attend.

3. The school division will maintain a competency record for each student which identifies areas and levels of task achievement. This record will become a part of the student's official record and will be forwarded to Thomas Nelson Community College as part of the student's high school transcript.

4. Credit at Thomas Nelson Community College will be granted for competencies mastered at an achievement level of 3.0 or better on a scale of 0-4, as defined in the respective instructional resource guides, providing continuation of study in the program area begins within two academic years after graduation from the secondary school.

5. The college will provide a list of current courses for which advanced credit (in total or in part) applies.

6. No examinations will be required for granting credit for achievement of a competency and no fee will be required for advanced credit.

7. All participating new faculty and administrators, full-time and part-time, will have training in competency-based education and will receive orientation on the articulation process described herein.

8. This agreement will be reviewed annually as stated in number two above and, in addition, will be reviewed by the President of Thomas Nelson Community College and the Superintendent of Hampton City School Division, or their designees, every three years.

Thomas S. Kubala	Edward R. Sztuka
President, Thomas Nelson Community College	Superintendent of Hampton City Schools
Date June 4, 1982	Date June 4. 1982

DUTY AREA

9.0 PREPARING WORKING DRAWINGS

PROGRAM

MECHANICAL DRAFTING

TASK/COMPETENCY

9.2 Prepare section and convention views

COURSE

Basic Technical Drawing (8435)
Drafting I (8530)
DRFT 151 (VCCS)

9.2

PERFORMANCE OBJECTIVE

P 9.2 Given mechanical parts, sketches, and multiview or pictorial drawings, prepare and dimension a drawing with section and convention views according to ANSI Standard Y 14.3 and Y 14.5.

SELECTED ENABLING OBJECTIVES

E 9.2.1 Explain the theory, technique, and purpose of sectional views.

E 9.2.2 Prepare sketches and drawings demonstrating appropriate:

a. Section lining techniques for various materials
b. Use of visible, hidden, and center lines in section views

E 9.2.3 Identify and prepare drawings and sketches of objects requiring:

a. Full sections
b. Half sections
c. Broken-out sections
d. Revolved sections
e. Removed sections

E 9.2.4 Prepare drawings and sketches of section views of parts that:

a. Include ribs, webs, and spokes
b. Require revolved features

E 9.2.5 Prepare drawings and sketches of an object that could be depicted in a half-view and section view.

E 9.2.6 Demonstrate the appropriate method of dimensioning a full section.

E 9.2.7 Prepare a section drawing in ink or drafting film.

E 9.2.8 Prepare section drawings in English and metric measurements.

CRITERION-REFERENCED MEASURE

C 9.2 Prepare and dimension a drawing of a given mechanical part with sections and convention views according to ANSI standard Y 14.2 and Y 14.5.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss section lining symbols for different materials (E 9.2.1).
2. Critique drafter's sketches prior to the start of any section drawing. (NOTE: Sketches are graded for technique only. They are intended as teaching vehicles for solutions to drawing problems) (E 9.2.2-E 9.2.8).
3. Assign mechanical parts to be draw in section views (E 9.2.2-E 9.2.8).
4. Show film on full and half sections (E 9.2.3).
5. Show films on revolved and removed sections (E 9.2.3).
6. Critique, correct, and review assignments (as necessary) for revision by the drafter (E 9.2.1-E 9.2.8).

SELECTED TOOLS AND MATERIALS

Drafting film

Mechanical parts or pictorial drawings

SELECTED AUDIOVISUAL MATERIALS

"Full Sections and Half Sections." McGraw-Hill Films.

"Revolved Sections and Removed Sections." McGraw-Hill Films.

SELECTED REFERENCES

ANSI Standard Y 14.3, Multi and Sectional View Drawings.

ANSI Standard Y 14.5, Dimensioning and Tolerancing.

Basic Technical Drawing. Henry Cecil Spencer and John T. Dygdon.

Drafting Technology and Practice. William P. Spence.

Engineering Drawing and Graphic Technology. Thomas E. French and Charles Vierck.

Technical Drawing. Frederick E. Giesecke, Alva Mitchell, Henry Cecil Spencer, and Van Leroy Hill.

NEWPORT NEWS PUBLIC SCHOOLS
Newport News, Virginia

Vocational Competency Record

Student's Name ____________________

Birthdate ____________________

Program ____________________

Courses Taken: ____________________

____

____

Student Number ____________________

School ____________________

Completion Date of Program ____________________

____
Teacher's Signature

This student has demonstrated employment skills related to the following entry-level jobs:

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________

Rating Scale

1. No experience in performing task.
2. Performs task below job entry level.
3. Performs task at job entry level.
4. Performs task above job entry level.

Competency/Task	Final Rating			
	1	2	3	4

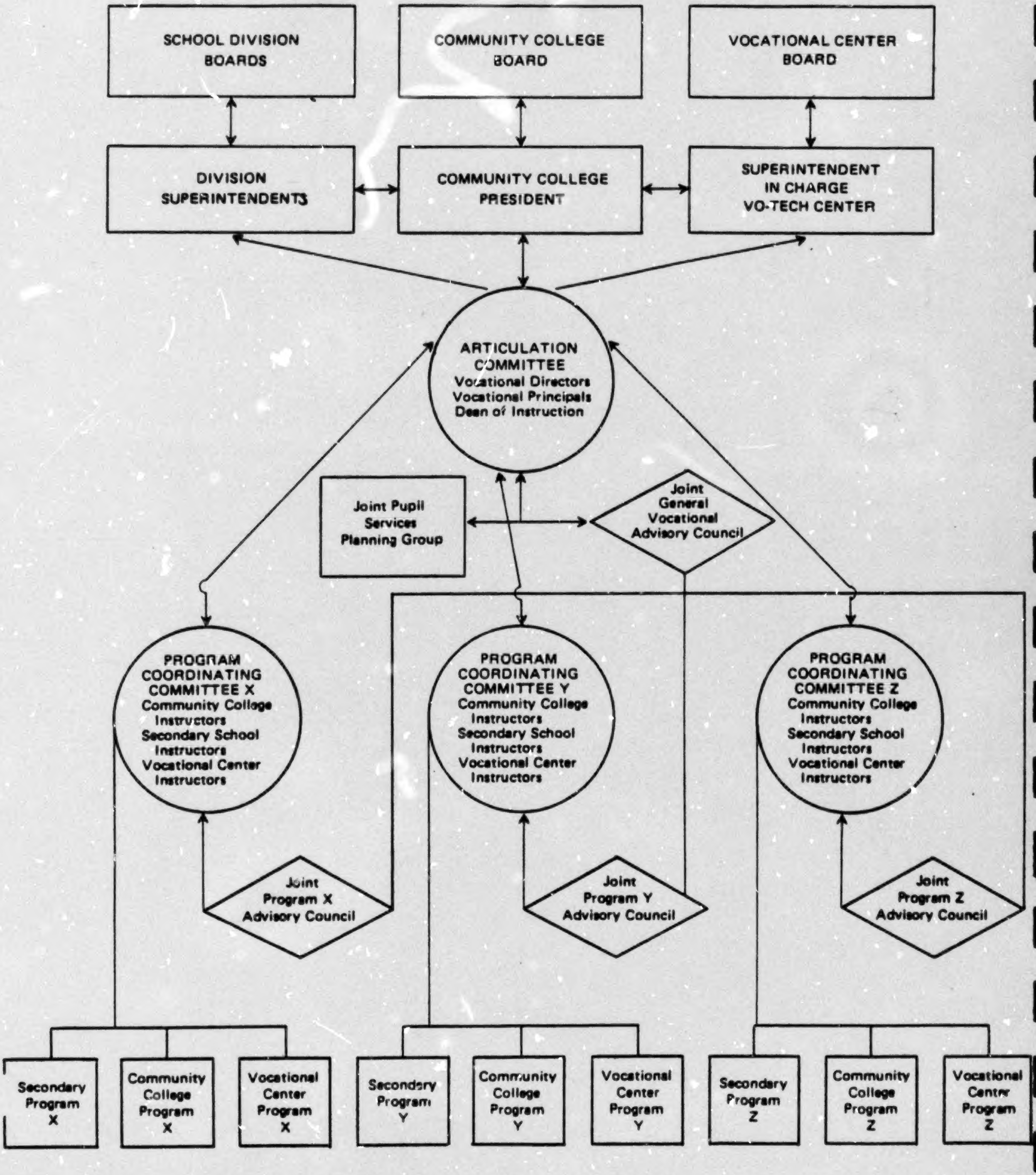
Competency/Task	Final Rating			
	1	2	3	4

Competency/Task	Final Rating			
	1	2	3	4

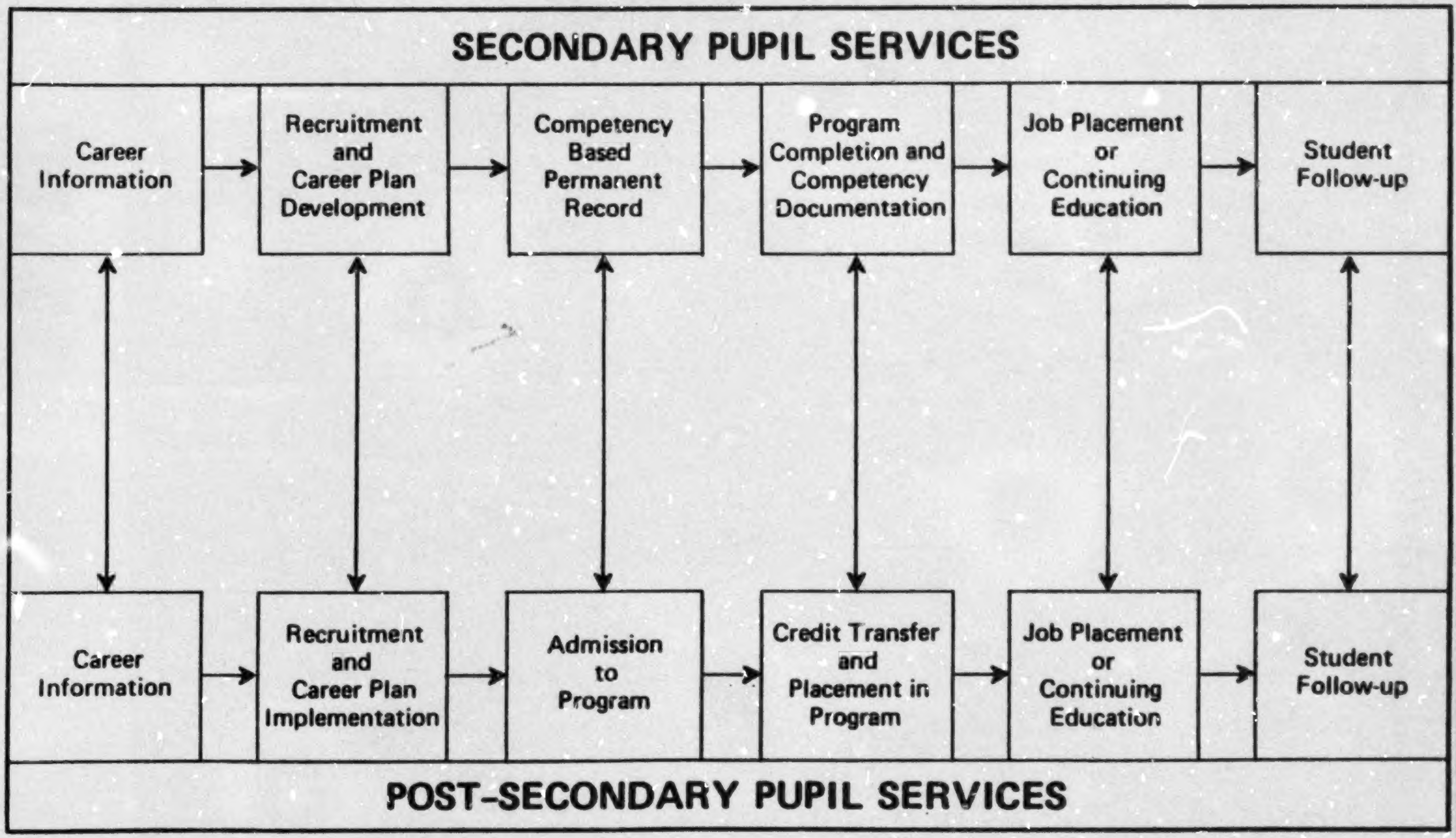
Competency/Task	Final Rating			
	1	2	3	4

Comments

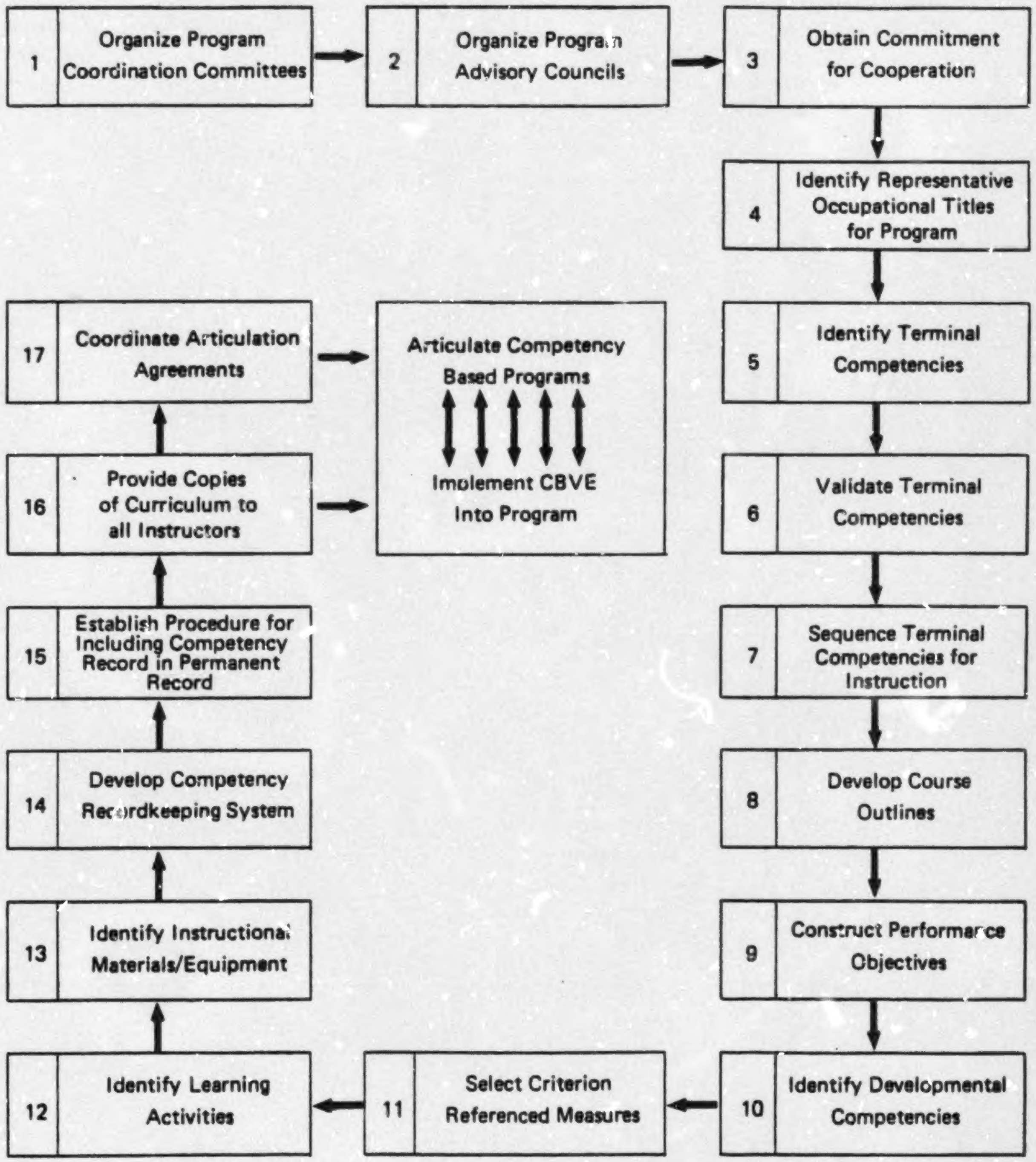
D. SAMPLE COMMUNICATION STRUCTURE TO FACILITATE ARTICULATION EFFORTS

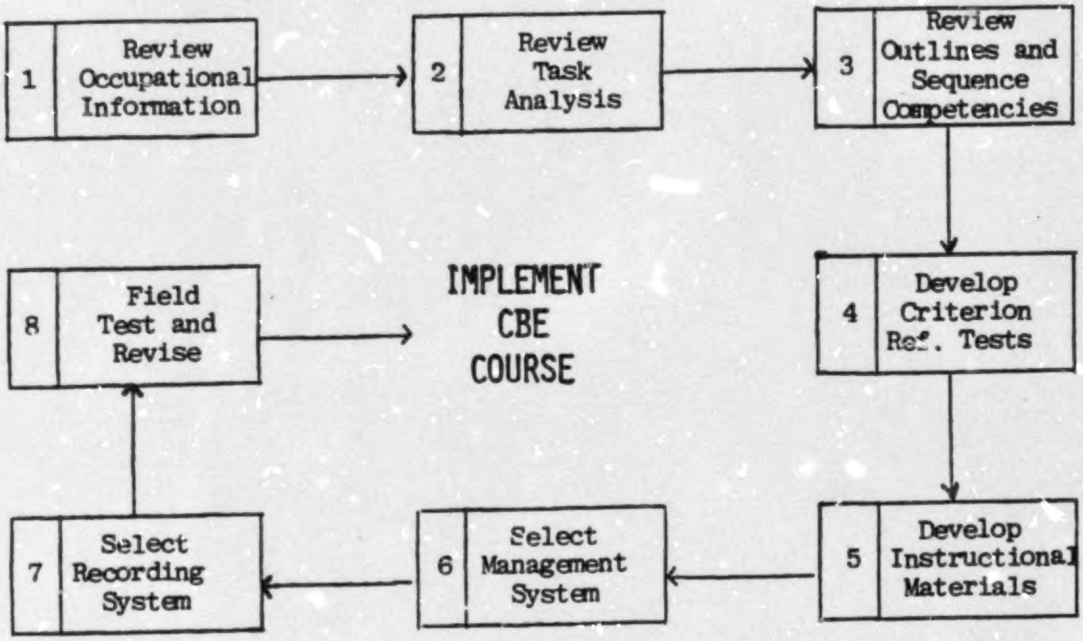

SCHOOL DIVISION BOARDS
COMMUNITY COLLEGE BOARD
VOCATIONAL CENTER BOARD
DIVISION SUPERINTENDENTS
COMMUNITY COLLEGE PRESIDENT
SUPERINTENDENT IN CHARGE VO-TECH CENTER
ARTICULATION COMMITTEE
Vocational Directors
Vocational Principals
Dean of Instruction
Joint Pupil Services Planning Group
Joint General Vocational Advisory Council
PROGRAM COORDINATING COMMITTEE X
Community College Instructors
Secondary School Instructors
Vocational Center Instructors
PROGRAM COORDINATING COMMITTEE Y
Community College Instructors
Secondary School Instructors
Vocational Center Instructors
PROGRAM COORDINATING COMMITTEE Z
Community College Instructors
Secondary School Instructors
Vocational Center Instructors
Joint Program X Advisory Council
Joint Program Y Advisory Council
Joint Program Z Advisory Council
Secondary Program X
Community College Program X
Vocational Center Program X
Secondary Program Y
Community College Program Y
Vocational Center Program Y
Secondary Program Z
Community College Program Z
Vocational Center Program Z

E. COORDINATED STUDENT SERVICES FOR STUDENTS IN ARTICULATED VOCATIONAL PROGRAMS

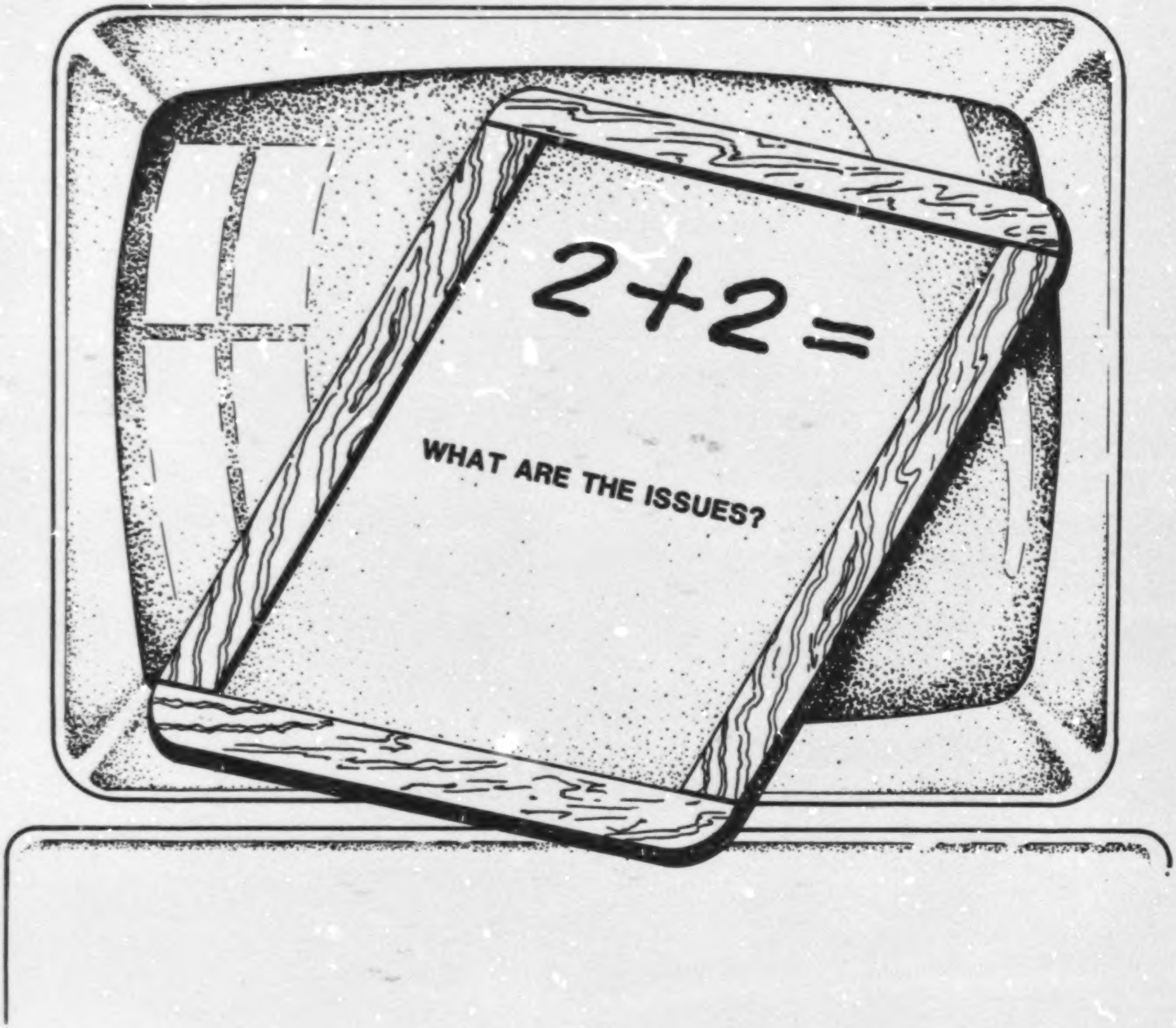

SECONDARY PUPIL SERVICES
Career Information
Recruitment and Career Plan Development
Competency Based Permanent Record
Program Completion and Competency Documentation
Job Placement or Continuing Education
Student Follow-up
Career Information
Recruitment and Career Plan Implementation
Admission to Program
Credit Transfer and Placement in Program
Job Placement or Continuing Education
Student Follow-up
POST-SECONDARY PUPIL SERVICES

CURRICULUM COORDINATION PROCEDURE CHART


1 Organize Program Coordination Committees
2 Organize Program Advisory Councils
3 Obtain Commitment for Cooperation
4 Identify Representative Occupational Titles for Program
5 Identify Terminal Competencies
6 Validate Terminal Competencies
7 Sequence Terminal Competencies for Instruction
8 Develop Course Outlines
9 Construct Performance Objectives
10 Identify Developmental Competencies
11 Select Criterion Referenced Measures
12 Identify Learning Activities
13 Identify Instructional Materials/Equipment
14 Develop Competency Recordkeeping System
15 Establish Procedure for Including Competency Record in Permanent Record
16 Provide Copies of Curriculum to all Instructors
17 Coordinate Articulation Agreements
Articulate Competency Based Programs
Implement CBVE Into Program


1 Review Occupational Information
2 Review Task Analysis
3 Review Outlines and Sequence Competencies
4 Develop Criterion Ref. Tests
5 Develop Instructional Materials
6 Select Management System
7 Select Recording System
8 Field Test and Revise
IMPLEMENT CBE COURSE

The above procedure which has been illustrated for implementing CBE may be modified to meet local requirements and needs. It is important to realize that the materials in this guide are a resource only and that additional materials may be necessary to meet the requirements of local industry. Additional information concerning the implementing of CBE is provided in the Guide for Implementing Competency-Based Education, Virginia Department of Education.


2+2=
WHAT ARE THE ISSUES?

TWO-PLUS-TWO SECONDARY/POSTSECONDARY ARTICULATED PROGRAM

Some possible benefits of articulation are listed below. For each item, indicate if you believe that item affects the student, secondary school, postsecondary school, or has no effect at all.

S - Student
SS - Secondary School
PS - Postsecondary School
NE - No Effect

Some of the desirable benefits of articulation that affect both the student and the institution are listed below:

____ 1. Reduces duplication of effort and time for the student at the postsecondary level who has acquired job skills in high school.

____ 2. Enhances job opportunities for the student by identifying student job qualifications more accurately.

____ 3. Provides an opportunity for students to acquire marketable job skills in a more effective and efficient manner.

____ 4. Provides for improved guidance, placement and follow-up services for students through planning by staff at the local level.

____ 5. Provides a more realistic procedure for evaluation of student performance and for evaluation of vocational/technical programs.

____ 6. Provides savings in expenditures for both students and institutions.

____ 7. Improves communication between secondary and postsecondary administrators, vocational/technical educators, and guidance counselors.

____ 8. Improves vocational/technical program content and performance standards.

____ 9. Promotes better utilization of available equipment, materials, and facilities.

____ 10. Establishes more active vocational/technical program advisory committees, thus increasing community participation in and support for vocational/technical education.

____ 11. Establishes an improved atmosphere for cooperation in the areas of personnel development, policy development and other instructionally related areas.

ARTICULATION –

REQUIRES COOPERATION BETWEEN:

- POSTSECONDARY ADMINISTRATORS AND FACULTY
- SECONDARY ADMINISTRATORS AND TEACHERS
- COUNSELORS
- INDUSTRIAL EMPLOYERS

Articulation of technical training at the secondary/postsecondary level is now the subject of intense discussion and planning among educators. The issues are being defined and the lines of communication strengthened. Articulation requires cooperation between postsecondary administrators and faculty, secondary administrators and teachers, counselors, and industrial employers.

Some of these issues involved in articulation are listed on the next page.

ARTICULATION ISSUES

- JOBS – IS PREPARATION BEYOND HIGH SCHOOL REQUIRED?
- CURRICULUM – WHAT SHOULD BE TAUGHT?
- TURF – WHICH INSTITUTION SHOULD OFFER A PARTICULAR COURSE?
- CREDIT – WHAT DETERMINES SATISFACTORY COMPLETION OF A COURSE?
- FACILITIES – WHERE SHOULD A COURSE BE TAUGHT?
- FACULTY – WHO SHOULD TEACH A PARTICULAR COURSE? WHY?

CORD

ARTICULATION ISSUES (continued)

- DURATION – WHAT SHOULD BE DONE WITH TIME SAVED THROUGH ARTICULATION?

  – SHOULD CO-OP TRAINING BE INCLUDED?

- ACCREDITATION – HOW SHOULD ACCREDITATION BE SOUGHT?

- EVALUATION – WHO AND WHAT MEASURE THE EFFECTIVENESS OF THE PROGRAM?

- STUDENTS – DO WIDE VARIANCES IN ABILITIES REQUIRE THE DEVELOPMENT OF MULTIPLE TRACKS?

- REVIEW OF AGREEMENT – HOW OFTEN SHOULD ARTICULATION AGREEMENT BE REVIEWED AND REVISED?

DISCUSSION OF ARTICULATION ISSUES

1. What do you want to accomplish as a result of articulating your education programs?

2. Why do you think students, business, industry and schools of your area are willing or unwilling to support articulation?

Students

Businesses

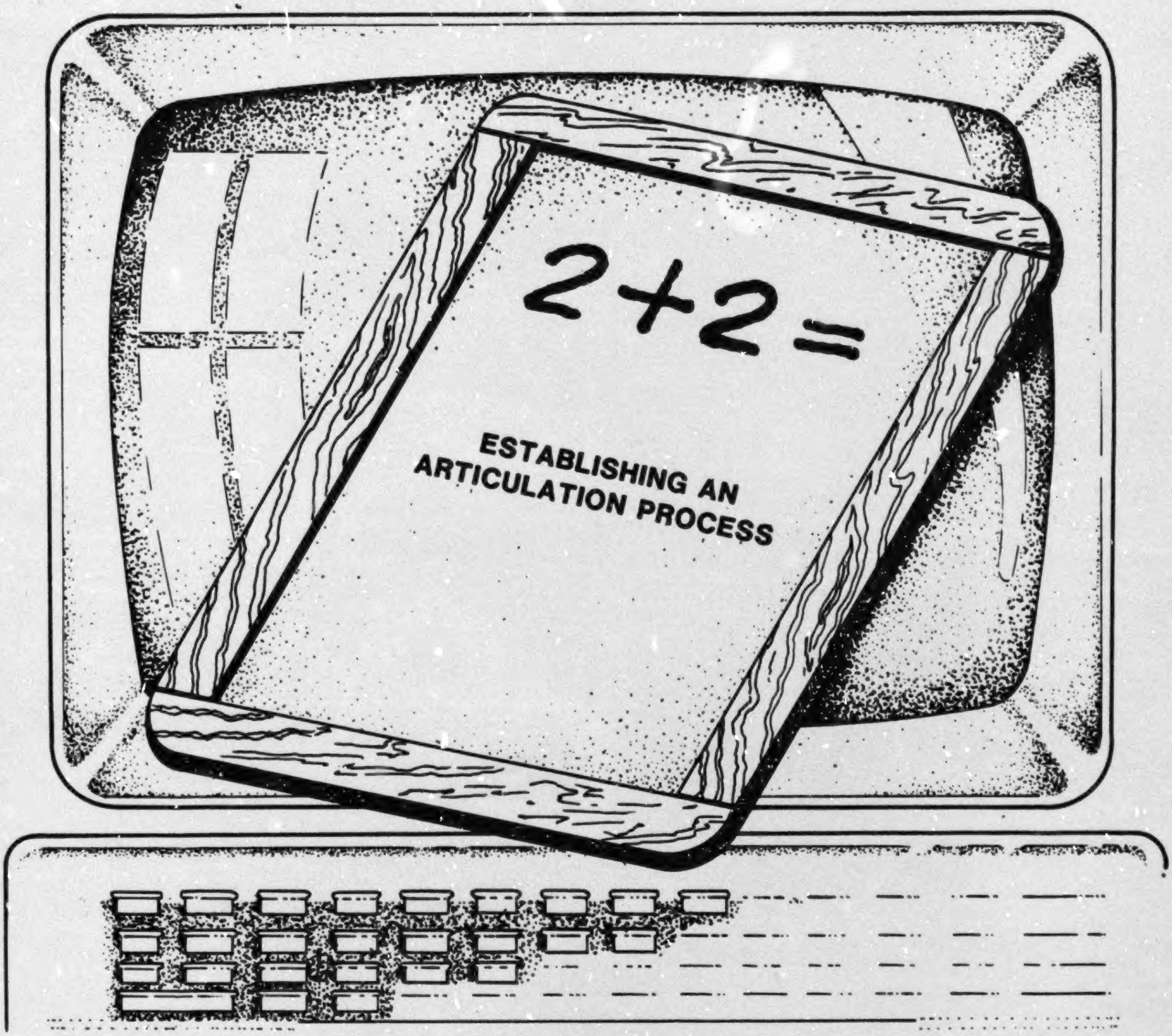
Industries

High school
- Administrators

- Faculty

Postsecondary
- Administrators

- Faculty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ESTABLISHING AN
ARTICULATION PROCESS

ESTABLISHING AN ARTICULATION PROCESS

W. Alan Sosbe

Mr. W. Alan Sosbe is a Research Associate for the Center for Occupational Research and Development (CORD). For several years Mr. Sosbe served as a Training Development Specialist in the Technical Training Department of J.I. Case Tractor Company. While at Case, he also served as a Test Engineer, working with experimental diesel engines, and as a Service Manager. In addition, Mr. Sosbe has worked in metallurgical engineering and has received his Bachelor of Education and Master of Education degrees from Purdue University.

CORD

2+2 PROGRAM JUSTIFICATION

HIGH SCHOOL

- WHAT ARE WE DOING FOR ≈ 50% OF STUDENT POPULATION THAT IS NOT PURSUING AN ACADEMIC OR TERMINAL VOCATIONAL TRACK?
- WHAT ARE CHARACTERISTICS OF OF THOSE STUDENTS?
- WHAT ARE THEIR EXPECTATIONS BEYOND HIGH SCHOOL?
  - -- CAPABILITY
  - -- MOTIVATION
- WHAT CURRICULUM DID THEY COMPLETE IN HIGH SCHOOL?
- WHAT ARE RECENT STUDENTS DOING AFTER GRADUATION?
- HOW CAN STUDENTS BE GIVEN DIRECTION AND PREPARATION?

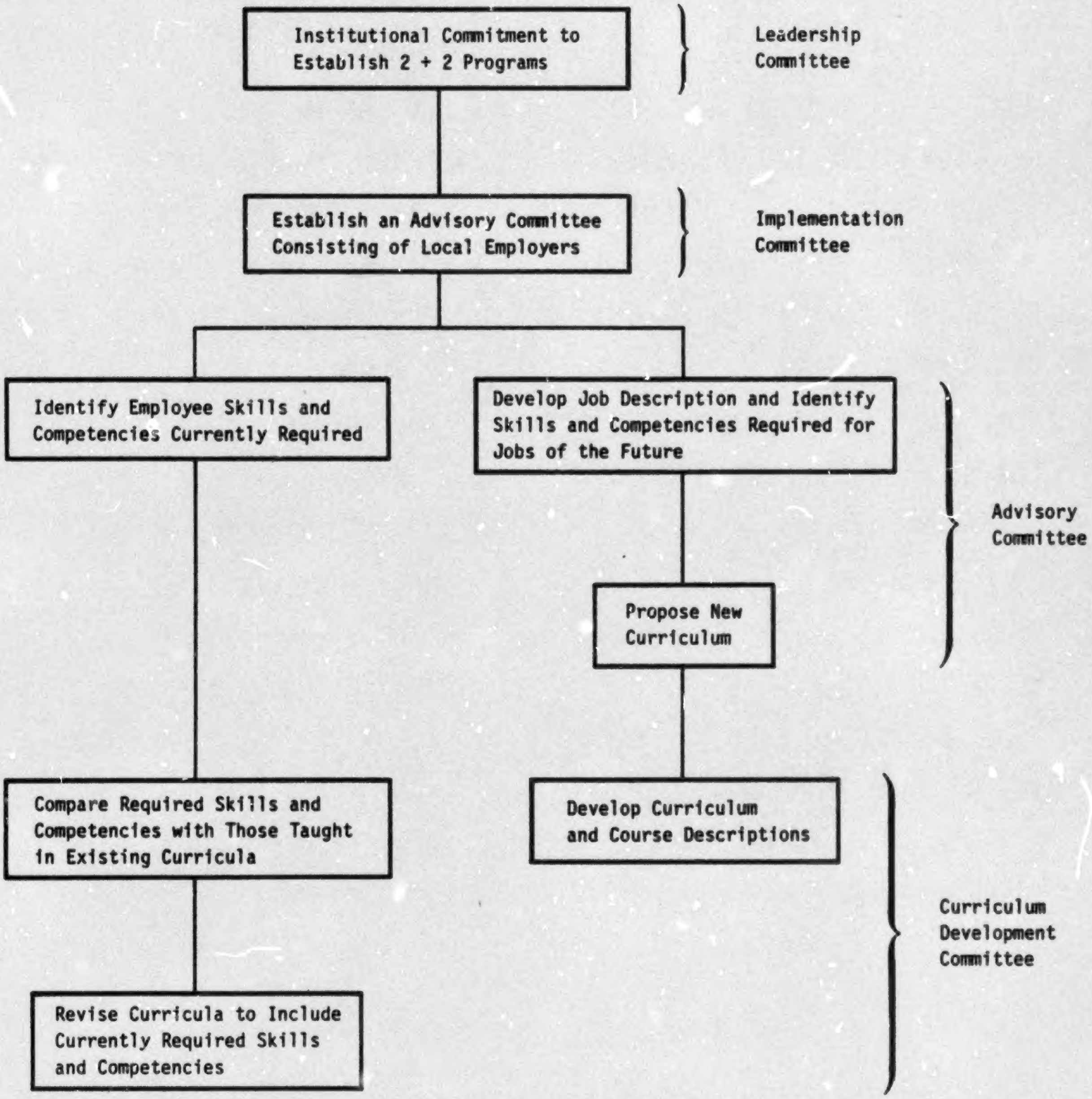
POSTSECONDARY

- HOW CAN WE PROVIDE ASSOCIATE DEGREE TECHNICIANS TO MEET FUTURE EMPLOYER NEEDS?
- WHAT ARE PRESENT AND FUTURE TECHNICIAN JOB REQUIREMENTS?
  - -- NUMBERS
  - -- COMPETENCIES
  - -- EXPERIENCE
- ARE PRESENT PROGRAMS ADEQUATE?
- WHAT CURRICULUM CHANGES ARE NEEDED?
- CAN THE INSTITUTION ADEQUATELY RESPOND TO REQUIRED CHANGES?
  - -- TIME (IS 2 YEARS ENOUGH?)
  - -- RESOURCES (TEACHERS, EQUIPMENT)
  - -- CAPABILITY OF STUDENTS

NEED TO WORK TOGETHER AND
COMMIT TO 2 + 2 PROGRAMS

INSTITUTIONAL COMMITMENT IS MANDATORY

2+2 PROCESS


Institutional Commitment to Establish 2 + 2 Programs
Leadership Committee
Establish an Advisory Committee Consisting of Local Employers
Implementation Committee
Identify Employee Skills and Competencies Currently Required
Develop Job Description and Identify Skills and Competencies Required for Jobs of the Future
Advisory Committee
Propose New Curriculum
Compare Required Skills and Competencies with Those Taught in Existing Curricula
Develop Curriculum and Course Descriptions
Curriculum Development Committee
Revise Curricula to Include Currently Required Skills and Competencies

2+2 AND ARTICULATION

2 + 2 PROGRAMS

- JUSTIFICATION
- COMMITMENT
  - -- H. S. INSTITUTIONS
  - -- P. S. INSTITUTIONS
- PLANNING
  - -- BUSINESS AND INDUSTRY NEEDS
  - -- TARGET STUDENTS

LEADS TO

↓

ARTICULATION PROCESS

- ORGANIZE WORKING GROUPS
- ESTABLISH TASKS/RESPONSIBILITIES
- DETERMINE SCHEDULE
- ORGANIZE CURRICULUM
- PREPARE ARTICULATION AGREEMENTS
- INITIATE PROGRAMS
- EVALUATE PERIODICALLY

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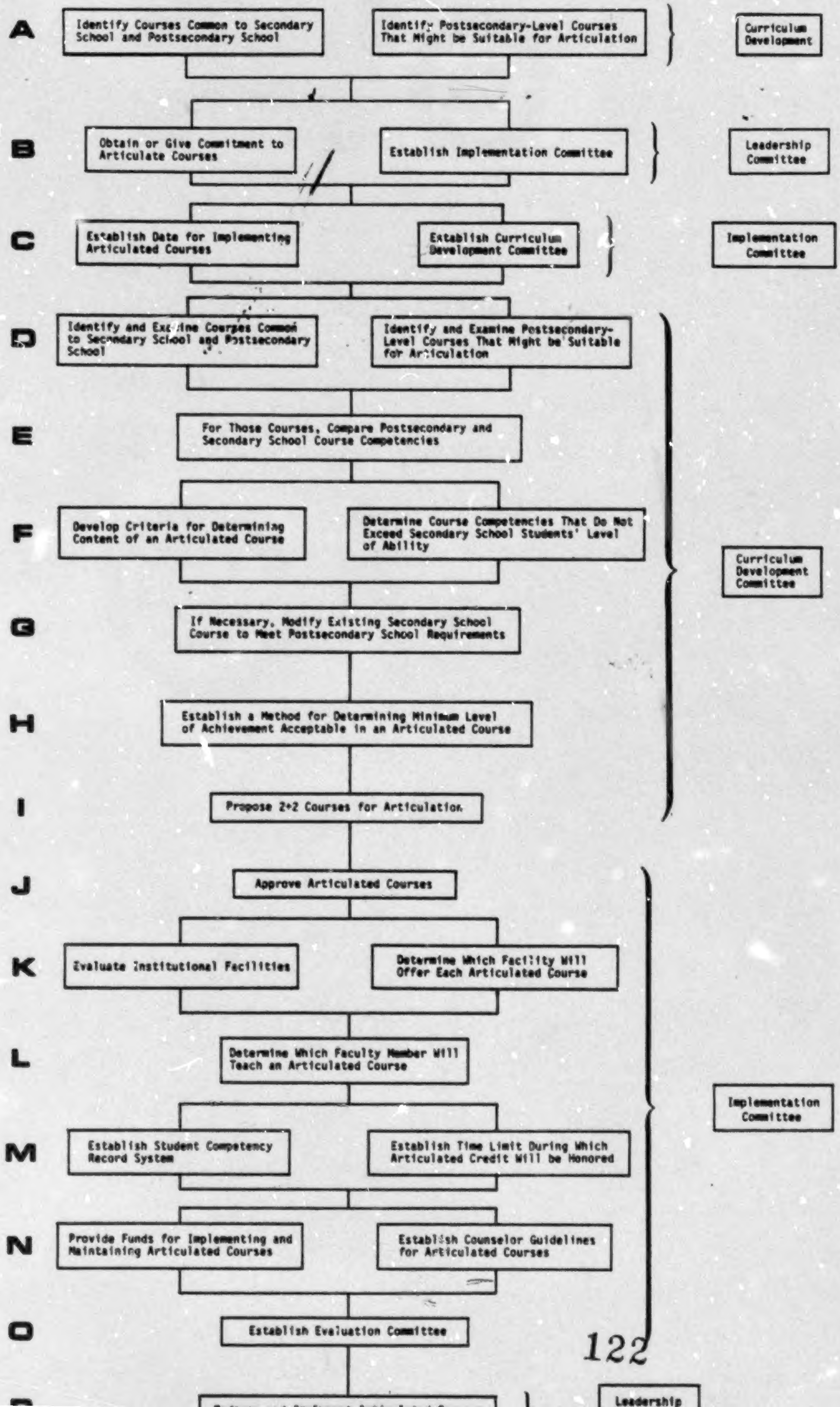
A SUGGESTED ARTICULATION PLAN


A
Identify Courses Common to Secondary School and Postsecondary School
Identify Postsecondary-Level Courses That Might be Suitable for Articulation
Curriculum Development
B
Obtain or Give Commitment to Articulate Courses
Establish Implementation Committee
Leadership Committee
C
Establish Date for Implementing Articulated Courses
Establish Curriculum Development Committee
Implementation Committee
D
Identify and Examine Courses Common to Secondary School and Postsecondary School
Identify and Examine Postsecondary-Level Courses That Might be Suitable for Articulation
E
For Those Courses, Compare Postsecondary and Secondary School Course Competencies
F
Develop Criteria for Determining Content of an Articulated Course
Determine Course Competencies That Do Not Exceed Secondary School Students' Level of Ability
Curriculum Development Committee
G
If Necessary, Modify Existing Secondary School Course to Meet Postsecondary School Requirements
H
Establish a Method for Determining Minimum Level of Achievement Acceptable in an Articulated Course
I
Propose 2+2 Courses for Articulation
J
Approve Articulated Courses
K
Evaluate Institutional Facilities
Determine Which Facility Will Offer Each Articulated Course
L
Determine Which Faculty Member Will Teach an Articulated Course
Implementation Committee
M
Establish Student Competency Record System
Establish Time Limit During Which Articulated Credit Will be Honored
N
Provide Funds for Implementing and Maintaining Articulated Courses
Establish Counselor Guidelines for Articulated Courses
O
Establish Evaluation Committee
Leadership

2+2/ARTICULATION MILESTONES

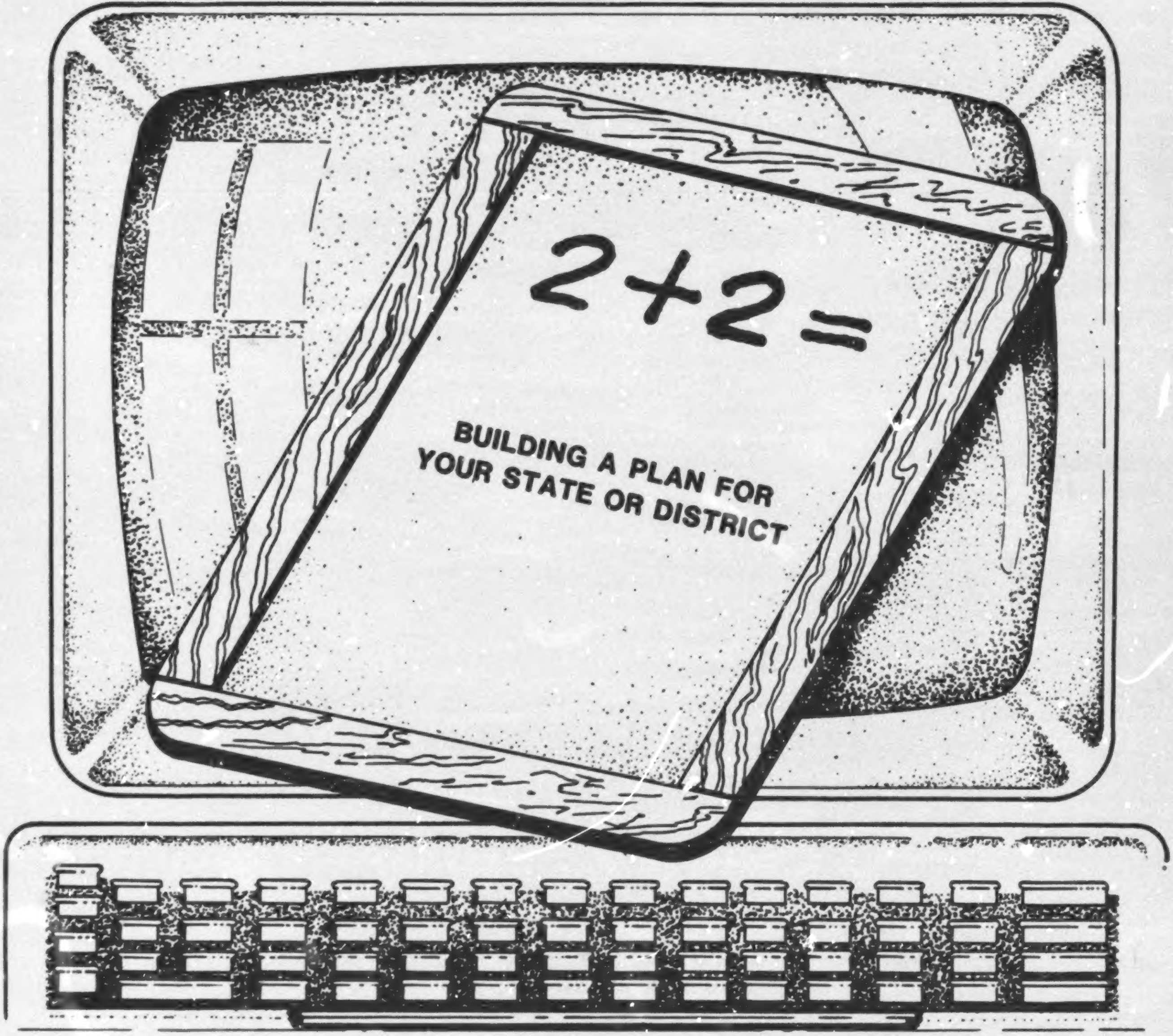
- JUSTIFY AND SECURE INSTITUTIONAL COMMITMENT FOR 2 + 2 PROGRAMS

- ESTABLISH INSTITUTIONAL COMMITMENT TO ARTICULATION IMPLEMENTATION
  - -- SECURE AGREEMENT WITH LOCAL ADMINISTRATION AND STATE-LEVEL PERSONNEL TO SUPPORT AND IMPLEMENT ARTICULATION

- IDENTIFY POTENTIAL INSTITUTIONS AND PEOPLE TO BE INVOLVED
  - -- LOCAL AND STATE LEVELS

- ESTABLISH ARTICULATION COMMITTEES
  - -- LEADERSHIP COMMITTEE
  - -- IMPLEMENTATION COMMITTEE
  - -- CURRICULUM DEVELOPMENT COMMITTEE
  - -- EVALUATION COMMITTEE

- IMPLEMENT 2 + 2 ARTICULATION PLAN


2+2=
BUILDING A PLAN FOR YOUR STATE OR DISTRICT

List courses currently offered at the postsecondary level, that are very similar to courses offered at the secondary schoool. (These courses are the ones that are highly desirable for articulation.)

	Course Name	Name of the Postsecondary School Offering the Course
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

List courses currently offered at the postsecondary level, that you believe could be but are not currently offered at the secondary schoool. (These courses are potentially suitable for articulation.)

	Course Name	Name of the Postsecondary School Offering the Course
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

For each course listed on the previous two pages, identify the postsecondary school curriculum or curriculums of which each course is a part. (Doing this will help you visualize the impact articulation can have.)

Course Name Postsecondary School Curriculum

______________________ 1. ______________________
______________________ 2. ______________________
______________________ 3. ______________________
______________________ 4. ______________________
______________________ 5. ______________________

______________________ 1. ______________________
______________________ 2. ______________________
______________________ 3. ______________________
______________________ 4. ______________________
______________________ 5. ______________________

______________________ 1. ______________________
______________________ 2. ______________________
______________________ 3. ______________________
______________________ 4. ______________________
______________________ 5. ______________________

If someone at the state or district level contacted you and proposed implementing an articulated plan, what would you want them to tell you about articulation? (The answer to this question will establish a list of items that you should discuss while talking with others about articulating your programs.)

List the state-level personnel and agencies whom you should contact to initiate articulation discussions.

Name:______________________________ Agency:______________________________
Title:______________________________ Address:______________________________
Phone:______________________________

Name:______________________________ Agency:______________________________
Title:______________________________ Address:______________________________
Phone:______________________________

Name:______________________________ Agency:______________________________
Title:______________________________ Address:______________________________
Phone:______________________________

Name:______________________________ Agency:______________________________
Title:______________________________ Address:______________________________
Phone:______________________________

List the local-level personnel and schools whom you should contact to initiate articulation discussions.

Name:______________________ School:__________________________
Title:_____________________ Address:_________________________
Phone:_____________________

Name:______________________ School:__________________________
Title:_____________________ Address:_________________________
Phone:_____________________

Name:______________________ School:__________________________
Title:_____________________ Address:_________________________
Phone:_____________________

Name:______________________ School:__________________________
Title:_____________________ Address:_________________________
Phone:_____________________

Identify potential members for each of the following committees.

LEADERSHIP COMMITTEE

DESCRIPTION: EXECUTIVE FROM EACH PARTICIPATING INSTITUTION

PURPOSE: SET POLICY, APPROVE ARTICULATION PLAN, SECURE RESOURCES

MEET: TWO TO THREE TIMES FOR IDENTIFICATION OF PROJECT REQUIREMENTS AND CONCURRENCE ON VARIOUS ISSUES

RESPONSIBILITIES

- APPROVE TENTATIVE PROJECT PLAN
- ASSIGN REPRESENTATIVES TO PROCEDURAL COMMITTEE
- INVOLVE/ENCOURAGE INSTITUTIONAL PARTICIPATION
- APPROVE AND IMPLEMENT ARTICULATION PLAN
- OBTAIN RESOURCES FOR PROGRAM IMPLEMENTATION AT INSTITUTION

REPRESENTATIVES

- ____
- ____
- ____
- ____

IMPLEMENTATION COMMITTEE

DESCRIPTION: ADMINISTRATOR FROM EACH PARTICIPATING INSTITUTION AS ASSIGNED BY THE INSTITUTIONAL EXECUTIVE

PURPOSE: TO DEVELOP GUIDELINES, PROCEDURES AND COOPERATIVE AGREEMENTS FOR ARTICULATED PROGRAMS; ASSIGN COMMITTEE REPRESENTATIVES AND DIRECT ACTIVITIES AT RESPECTIVE INSTITUTIONS

MEET: MONTHLY, CONTINUING UNTIL PROGRAMS ARE IMPLEMENTED

RESPONSIBILITIES:

- ESTABLISH PROGRAM ADVISORY COMMITTEE
- IDENTIFY/RESOLVE ADMINISTRATIVE ARTICULATION ISSUES
- DEVELOP PROCEDURE FOR IMPLEMENTING ARTICULATION PLAN
- ASSIGN REPRESENTATIVES TO THE IMPLEMENTATION COMMITTEES
- DRAFT ARTICULATION PLAN AND PROGRAM PROPOSALS
- ESTABLISH INSTITUTIONAL BUDGETS, PERSONNEL AND FACILITIES REQUIREMENTS FOR PROGRAM PARTICIPATION
- ASSIGN REPRESENTATIVES TO THE EVALUATION COMMITTEE

REPRESENTATIVES:

- ______________________________
- ______________________________
- ______________________________
- ______________________________

CURRICULUM DEVELOPMENT COMMITTEE

DESCRIPTION: PROGRAM SPECIALIST/FACULTY/STAFF

PURPOSE: IDENTIFY AND ADDRESS CURRICULUM AND IMPLEMENTATION ISSUES

MEET: MONTHLY

RESPONSIBILITIES:

- REVIEW CURRICULUM MODEL
- IDENTIFY WHERE/WHO WILL TEACH VARIOUS COURSES AND LABS
- ESTABLISH PROFICIENCY LEVELS FOR ARTICULATION CREDIT
- ESTABLISH REVIEW PROCESS
- IDENTIFY/ADDRESS CURRICULUM ISSUES FOR ARTICULATION

MEMBERSHIP:

EVALUATION COMMITTEE

DESCRIPTION: ADMINISTRATORS AND/OR PROGRAM PERSONNEL FROM PARTICIPATING INSTITUTIONS AND THREE STATE EDUCATION AGENCIES

PURPOSE: ESTABLISH GUIDELINES AND CONDUCT ONGOING EVALUATION OF ARTICULATED PROGRAMS

MEET: ONCE DURING DEVELOPMENT PHASE; TWICE PER YEAR AFTER PROGRAMS ARE INITIATED

RESPONSIBILITIES:

- DETERMINE CRITERIA AND PROCEDURES FOR EVALUATING ARTICULATED PROGRAMS
- CONDUCT EVALUATION ACTIVITIES OF ONGOING PROGRAMS AT PARTICIPATING INSTITUTIONS
- RECOMMEND PROGRAM CHANGES WHEN NEEDED

MEMBERSHIP:

ESTABLISH A TIME LINE FOR COMPLETING EACH OF THE FOLLOWING TASKS:

PROJECT SCHEDULE

MONTHS

PROJECT TASKS							
1 ESTABLISH ADVISORY COMMITTEES	—△						
2 ASSIGN COMMITTEES	△						
3 IDENTIFY NEEDS	——	△					
4 DEVELOP JOB DESCR. & COMPETENCIES							
5 DESIGN CURRICULUM & COURSES							
6 DETERMINE COURSE SEQUENCE							
7 DEVELOP COURSE OUT-LINES/LAB ACTIVITIES							
8 ESTABLISH PROFICIENCY LEVELS							
9 WRITE ARTICULATION PLAN							
10 DETERMINE APPROPRIATE FACULTY/FACILITY							
11 PREPARE BUDGETS							
12 SECURE RESOURCES							
13 CONDUCT WORKSHOP							
14 IMPLEMENT ARTICULATED PROGRAMS							

2+2/ARTICULATION MILESTONES

Check off the major tasks that you have accomplished in this workshop and list other tasks still to be done.

____ • Decide for yourself that 2+2/articulation is desirable and can be implemented in your region.

____ • Identify potential institutions and people to be involved
  - local and state levels

____ • Establish commitment to articulation implementation
  - secure verbal agreement with local administration and state-level personnel to support and implement articulation

____ • Identify potential members for articulation committees
  - Leadership Committee
  - Implementation Committee
  - Curriculum Development Committee
  - Evaluation Committee

____ • Implement articulation plan

GROUP REPORTS AND DISCUSSION

Gene Bottoms, Executive Director
The American Vocational Association
Arlington, Virginia

Dr. James E. (Gene) Bottoms serves as Executive Director of the American Vocational Association, the nation's major professional organization for vocational educators. Prior to taking up this position, Dr. Bottoms held such positions in the state of Georgia as Director of Educational Improvement and Assistant Director of Vocational Education, Georgia State Department of Education; Guidance Director, South Georgia Technical and Vocational School; and elementary school principal, Georgia public schools. Before entering the education field, Dr. Bottoms worked in the private sector for such organizations as Sears, General Motors, and Lockheed Aircraft. He received his Bachelor of Education, Master of Education, and Doctor of Education degrees from the University of Georgia.

GROUP REPORTS

1. Do most organizations in your group plan to develop articulation programs? What areas?

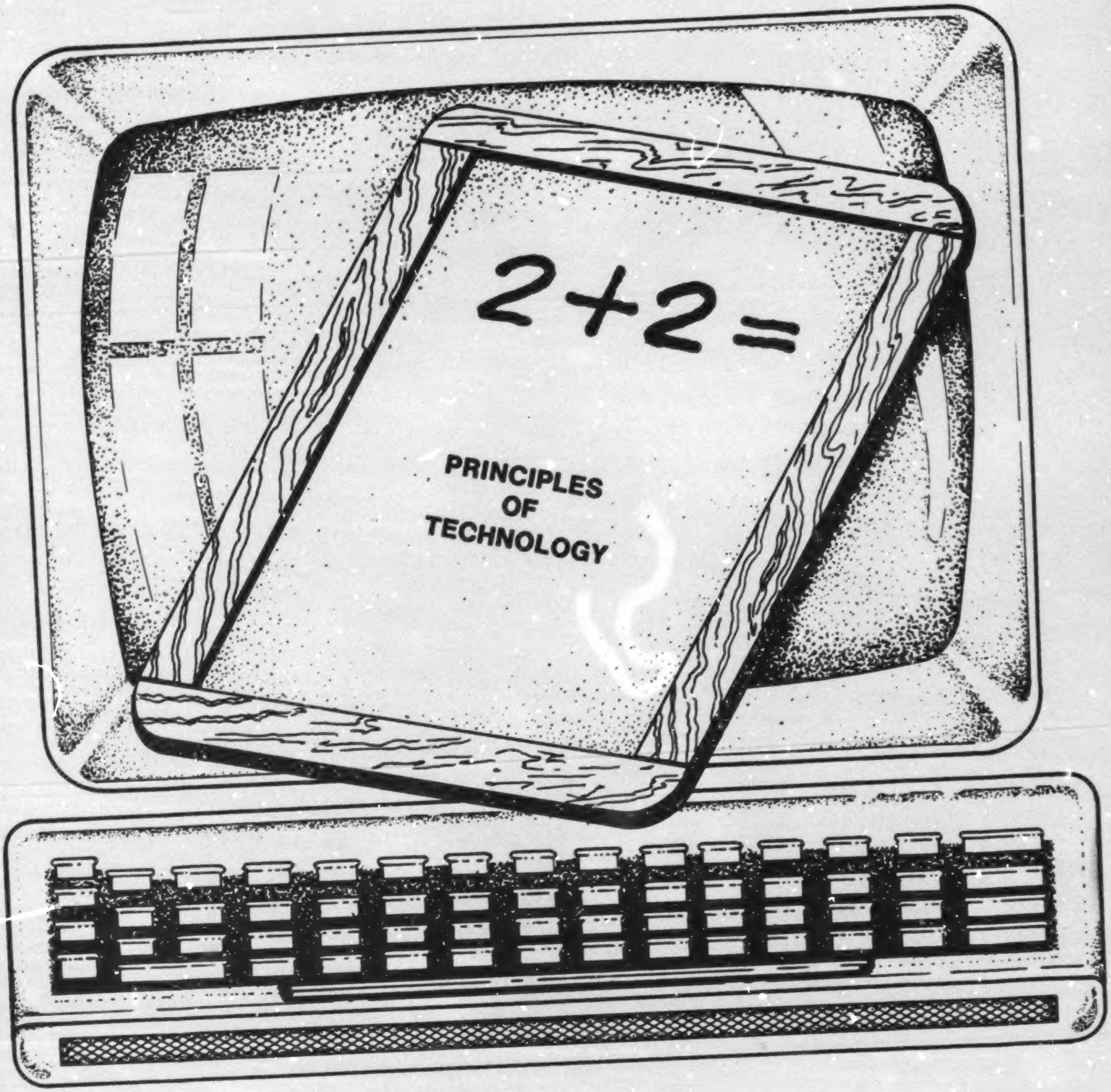
2. What are the major advantages/disadvantages of articulation? Of 2+2?

3. Which articulation issues do you think will be most troublesome?

4. Identify at least one strategy for dealing with the issue(s) in 3 (above).

5. Do you think the process and plan presented are reasonable and complete?

6. Other comments.


2+2=
PRINCIPLES
OF
TECHNOLOGY

PRINCIPLES OF TECHNOLOGY

A HIGH SCHOOL COURSE IN APPLIED SCIENCE THAT
- helps prepare tomorrow's technicians
- teaches technical principles and concepts
- improves science and mathematics skills
- provides hands-on laboratory experience

$3,000,000 funded by a consortium of
34 state and provincial vocational agencies

Daniel M. Hull
CENTER FOR OCCUPATIONAL RESEARCH AND DEVELOPMENT

Bennie F. Lucroy
AGENCY FOR INSTRUCTIONAL TECHNOLOGY

A POLARIZATION IN EDUCATIONAL PHILOSOPHY RESULTING FROM THE "HIGH-TECH CRISIS"

- LIBERAL ARTS/"COLLEGE BOUND"
- BEEF UP THE BASICS (R R R)
- NO RELEVANCE TO OR PREPARATION FOR WORK
- PREDICTED LOSS OF STUDENT INTEREST AND INCREASE OF DROPOUT RATE

← EXTREME

EXTREME →

- HIGHLY SPECIALIZED PROGRAM
- CURRENT EMPLOYABLE SKILLS
- ENTRY-LEVEL JOBS
- LITTLE PREPARATION FOR ADVANCEMENT
- NO FLEXIBILITY FOR ADAPTATION TO NEW AND CHANGING JOBS

NO MIDDLE GROUND

SINGLE-TRACK HIGH SCHOOL PLAN

TRADITIONAL VOC-ED APPROACH

INHERENT STRENGTHS OF VOC-ED PROGRAMS

1. RELEVANCE TO WORLD AND WORK EASILY IDENTIFIED
2. HANDS-ON LEARNING OFTEN CAPTURES INTEREST OF SEEMINGLY DISINTERESTED STUDENTS
3. WHAT IS LEARNED IS IMMEDIATELY USEFUL
4. HAS REDUCED DROPOUT RATE AMONG SOME CAPABLE STUDENTS

PERCEIVED WEAKNESSES OF EXISTING VOC-ED PROGRAMS

1. NARROW SPECIALIZATION
2. TEACHES SKILLS THAT MAY BECOME OBSOLETE QUICKLY
3. DOES NOT PROVIDE FOUNDATION FOR STRENGTHENING BASICS
4. FRACTIONATED – EACH TEACHER "DOES HIS/HER THING," WITH LITTLE REGARD FOR CONTINUITY IN DIRECTION
5. CURRICULA ARE FREQUENTLY "EQUIPMENT BASED" INSTEAD OF "KNOWLEDGE BASED" (I.E., PRINCIPLES)
6. IMAGE OF PROBLEM STUDENTS OR LOW ACHIEVERS

IMPLICATIONS FOR SECONDARY SCHOOLS

- STRENGTHEN APPLIED MATH
- STRENGTHEN APPLIED SCIENCE
- STRENGTHEN TECHNICAL READING/WRITING SKILLS
- DEVELOP LABORATORY HANDS-ON SKILLS
- DEVELOP COMPUTER LITERACY

PRINCIPLES OF TECHNOLOGY

PRINCIPLES OF TECHNOLOGY

"APPLIED SCIENCE FOR HIGH SCHOOL VOC-ED STUDENTS IN GRADES ELEVEN AND TWELVE"

PROGRAM DESIGN

- TWO-YEAR DURATION
- 14 UNITS TOTAL
- 26 CLASSES PER UNIT
- 169 CLASSES PER YEAR
- 50-MINUTE CLASSES PER DAY

INSTRUCTIONAL MATERIALS FOR EACH UNIT

- 6 VIDEO TAPES (~ 38 MINUTES)
- 100 PAGES OF STUDENT TEXT
- 8 HANDS-ON APPLICATION LABS
- 4 CLASSROOM DEMONSTRATIONS
- 4 MATH PRACTICE LABS

FOURTEEN UNITS THAT FORM THE FOUNDATION FOR PRINCIPLES OF TECHNOLOGY

FORCE
WORK
RATE
RESISTANCE
ENERGY
POWER
FORCE TRANSFORMERS
MOMENTUM
WAVES
ENERGY CONVERTORS
TRANSDUCERS
RADIATION
OPTICAL SYSTEMS
TIME CONSTANTS

FOUR COMMON ENERGY SYSTEMS

MECHANICAL

FLUID
  - HYDRAULIC
  - PNEUMATIC

ELECTRICAL

THERMAL

EXAMPLE: ASSEMBLY, DISASSEMBLY, REPAIR MODIFICATION, TROUBLESHOOTING OF AN AUTOMOBILE OR ROBOT REQUIRES KNOWLEDGE OF EACH SYSTEM.

TABLE 1. SUGGESTED TEACHING PLAN FOR PRINCIPLES OF TECHNOLOGY

(EACH RECTANGLE REPRESENTS A 50-MINUTE CLASS PERIOD)

UNIT OVERVIEW CLASS 1	0						
SUBUNIT 1 CLASS 2–7	C1	C2	M	L1	L2	R	MECHANICAL SYSTEMS
SUBUNIT 2 CLASS 8–13	C1	C2	M	L1	L2	R	FLUID SYSTEMS
SUBUNIT 3 CLASS 14–19	C1	C2	M	L1	L2	R	ELECTRICAL SYSTEMS
SUBUNIT 4 CLASS 20–25	C1	C2	M	L1	L2	R	THERMAL SYSTEMS
UNIT SUMMARY CLASS 26	S						

PEDAGOGICAL CONTENT FOR EACH UNIT

- ONE TECHNICAL CONCEPT
- CLASSROOM STUDY OF CONCEPT IN:
  - MECHANICAL SYSTEMS
  - FLUID SYSTEMS
  - ELECTRICAL SYSTEMS
  - THERMAL SYSTEMS
- LABORATORY APPLICATION OF CONCEPT IN:
  - MECHANICAL SYSTEMS
  - FLUID SYSTEMS
  - ELECTRICAL SYSTEMS
  - THERMAL SYSTEMS
- RELATED MATH PRACTICE LAB

PRINCIPLES OF TECHNOLOGY

ORGANIZATION OF COURSE MATERIAL

TECHNICAL CONCEPT	Subunit 1 MECHANICAL SYSTEMS	Subunit 2 FLUID SYSTEMS	Subunit 3 ELECTRICAL SYSTEMS	Subunit 4 THERMAL SYSTEMS
UNIT I (FORCE)	• Video • Principles • Math Lab • Hands-on Labs	•••{ same }•••	•••{ }••••	•••{ }•••
UNIT II (WORK)	• Video • Principles • Math Lab • Hands-on Labs	•••{ }•••	•••{ }••••	•••{ }•••
	⋮	⋮	⋮	⋮

PRINCIPLES OF TECHNOLOGY

UNIT 3: RATE

OVERALL CONTENTS

- UNIT OVERVIEW
    - VIDEO
    - PRINT
- MECHANICAL SYSTEMS AND FORCE
    - VIDEO
    - PRINT
    - MATH SKILLS LAB
    - HAND-ON LABS
- FLUID SYSTEMS AND PRESSURE
    - VIDEO
    - PRINT
    - MATH SKILLS LAB
    - HANDS-ON LABS
- ELECTRICAL SYSTEMS AND VOLTAGE
    - (DITTO)
- THERMAL SYSTEMS AND TEMPERATURE
    - (DITTO)
- UNIT SUMMARY

POTENTIAL USES FOR

PRINCIPLES OF TECHNOLOGY

	CONCEPTS (DESCRIPTION)	DEMONSTRATION	PROBLEMS AND APPLICATIONS LABORATORIES
TECH	PROJ. DEV.	PROJ. DEV.	PROJ. DEV.
TRADES	PROJ. DEV.	PROJ. DEV.	LOCAL DEV.
OTHER VOC. ED	PROJ. DEV.	LOCAL DEV.	LOCAL DEV.

PRINCIPLES OF TECHNOLOGY

IS

- AN APPLIED PHYSICS COURSE "DRESSED IN THE CLOTHES" OF MODERN TECHNOLOGY
- BASED ON THE PRINCIPLES AND ORGANIZATION OF UTC PHYSICS
- EMPHASIZING ANALOGIES IN MECHANICAL--FLUID--ELECTRICAL--THERMAL SYSTEMS
- TAUGHT 50% IN HARDWARE AND PROBLEM-SOLVING LABORATORIES
- STRENGTHENING NEEDED MATH SKILLS
- COMPLEMENTARY TO VO-TECH CURRICULA

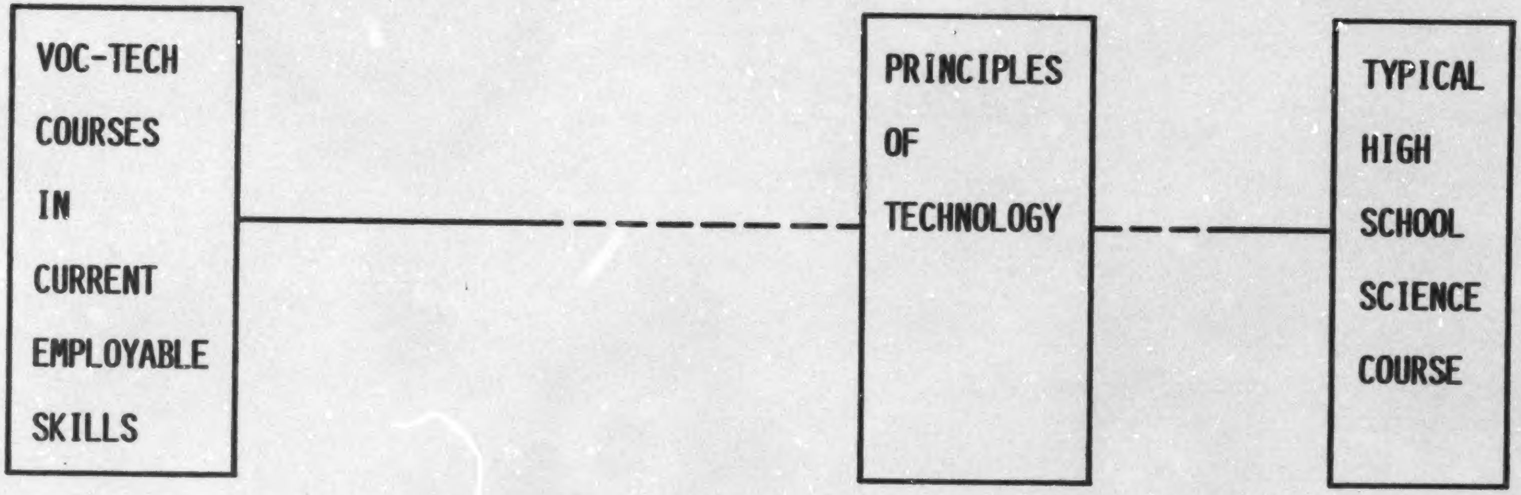
PRINCIPLES OF TECHNOLOGY

IS NOT

- AN ACADEMIC-ORIENTED SCIENCE COURSE
- A MATH COURSE
- A VOCATIONAL SKILLS COURSE
- A REPLACEMENT FOR ALL VO-TECH COURSES
- EASY

PRINCIPLES OF TECHNOLOGY

WHAT IS PRINCIPLES OF TECHNOLOGY ?



VOC-TECH COURSES IN CURRENT EMPLOYABLE SKILLS

PRINCIPLES OF TECHNOLOGY

TYPICAL HIGH SCHOOL SCIENCE COURSE

BIBLIOGRAPHY

McCormick, Fred C. A Comprehensive Study of the State of the Art of Articulation Efforts in Vocational Education: Present and Future Implications for the State of Illinois. Education Operations Study for the Illinois State Board of Education. 1980.

Cone, W. Henry, and James Hardy. School-University Network: Toward a Model of Articulation (A Project of the Council on Research and Service), North Carolina Association Quarterly, 1978, 337-343.

Bushnell, David, and Others. Articulating Vocational Education at the Post-Secondary Level. Papers from the AACJC/AVA Joint Study. 1977.

Fedderson, William, and William Loch. A Case Study in Successful Articulation: Williamsport Area Community College. Williamsport, Pennsylvania. 1977.

Greeson, Bernard, Editor. Summary Report: Articulation: Today and Tomorrow. An Articulation Conference Hosted by Milwaukee Public Schools. 1979.

Zane, Lawrence F. H., Editor. Institute for Advanced Study in Vocational-Technical Education: Collaborative Roles and Functions of Occupational Education Programs (Honolulu, Hawaii, October 1972-June 1973), Final Report. Honolulu, HI: Department of Curriculum and Instruction, Hawaii University.

New York State Education Department. A Study of the Articulation of Occupational Education Programs between Secondary and Postsecondary Institutions in New York State. Albany, NY: No date.

National Advisory Council on Vocational Education. Articulation: A Study by the National Advisory Council on Vocational Education. 1976.

Schlieman, John. Articulation of Secondary and Post-Secondary Vocational Programs in Hawaii: Follow-Up Study II. Honolulu, HI: Hawaii State Board for Vocational Education. 1976.

Heuchert, Arnie H., and Beverly W. Postlewaite, Editors. "Articulation of Vocational Education," Proceedings of the Sun Mountain Conference, Winthrop, Washington, May 18-20, 1975). Olympia, WA: Washington Research Coordinating Unit for Vocational Education. 1975.

Bushnell, David S. "Closing the Gap and Eliminating the Overlap: Two Case Studies in Articulation," American Vocational Journal, 53, 4, 21-3, 26. 1978.

Farah, John. Directory for Curriculum Articulation in Wisconsin. Madison, WI: Board of Vocational, Technical and Adult Education. 1978.

Blanchard, B. Everard. Behavioral Characteristics Peculiar to Articulation in American Educational Programs. Dayton, OH: Educational Research Center. 1972.

Oregon State Board of Education. An Approach to the Articulation and Coordination of Occupational Preparatory Curriculums from the High School through the Community College, Paper and Reports of Task Forces I and II. Salem, OR: Oregon State Department of Employment. 1968.

Bender, Louis W. Articulation of Secondary and Post-Secondary Occupational Education Programs, Information Series No. 76. Columbus, OH: Center for Vocational and Technical Education. 1973.

McKinnerney, Beryl R., and Others. Student Articulation between Secondary and Post-Secondary Education: A Suggested Guide. College Station, TX: Center for Career Development and Occupational Preparation, Texas A and M University. 1974.

Burger, Laura J., and Judith J. Lambrecht. Handbook for Vocational Instructors Interested in Competency-Based Education. Minneapolis, MN: Minnesota Research Coordinating Unit for Vocational Education. 1974.

Opachinch, Cheryl A., and James J. Linksz. A Handbook for Articulating High School and Community College Career Programs. Catonsville, MD: Catonsville Community College. 1974.

Canup, Claude R., Jr. Articulation with Secondary Schools, Paper Presented at the Annual Meeting of the American Vocational Association, Anaheim, California. 1975.

Spanbauer, Stanley. Bridging the Gap: A Model for Articulation between Secondary and Post-Secondary Vocational Educators in Wisconsin. Appleton, WI: Fox Valley Technical Institute. 1977.

Woelfer, Carlyle P. The Articulation of Ocupational Education Programs between Secondary Schools and Community Colleges/Technical Institutes Project. Research Project of the North Carolina Department of Public Instruction and the North Carolina Department of Community Coleges. 1978.

Project MAVE: Model for Articulated Vocational Education. Springfield, IL: Division of Adult Vocational and Technical Education, Illinois State Office of Education. 1978.

Alaska State Department of Education. 1979.

2 + 2 WORKSHOP PARTICIPANT EVALUATION

Please complete this evaluation, tear it out of your workbook and return it before you leave.

1. What did you hope to obtain by attending this workshop?

____

____

____

2. How well did the workshop meet your needs?

____

____

____

3. Please rate the workbook in terms of quality and usefulness.

_____ Excellent _____ Good _____ Fair _____ Poor _____ Useless

4. Please rate the presenters (10-highest, 0-lowest).

	Content	Presentation
Parnell	_____	_____
Hull	_____	_____
Isch	_____	_____
Washburn	_____	_____
Skogen	_____	_____
Cummings	_____	_____
Sosbe	_____	_____
Lucroy	_____	_____

5. This workshop will be conducted at AACJC next spring. What changes would you suggest?

____

____

____

____

Name ____________________________ Organization ____________________________